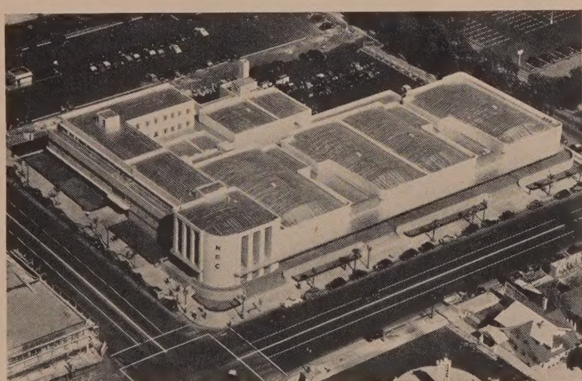
Architectural
CONCRETE

A Radio City for Hollywood

By W. A. Clarke* and R. E. Ward†

RADIO'S use of Hollywood cinema talent, which started in earnest a little more than five years ago has, within this short time, made necessary the development of large units of the broadcast industry in the middle of the movie capital. To produce the increasing number of major programs originating on the West Coast became an immediate, pressing problem for the big broadcasting companies which, until recently, had been operating with local station facilities which were limited to comparatively small studios. It was apparent at once that rental of theaters, temporary stages and halls for handling the big shows could be but a temporary solution to the problem, and not a very adequate one. This tended to spread out production units, decrease efficiency and increase costs; but a more serious handicap was recognized with the discovery that none of the rented theater facilities was technically suitable for modern broadcasting.



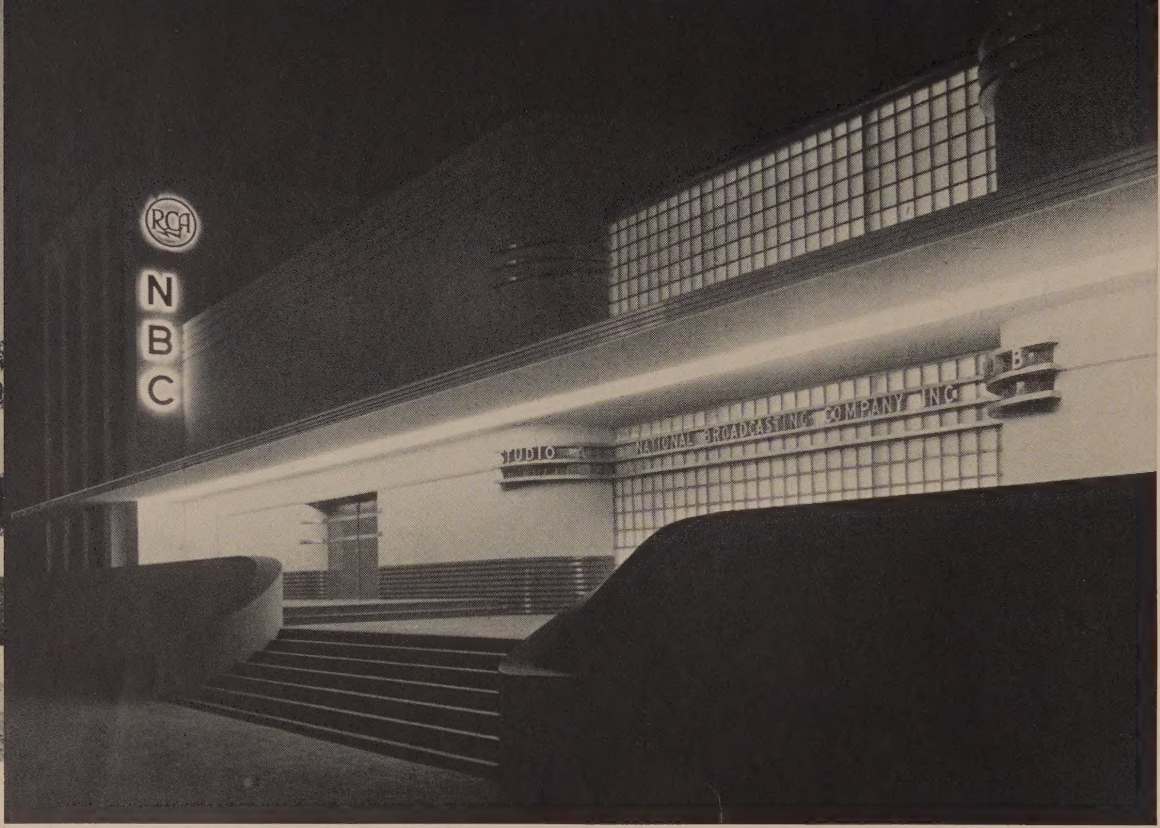
NBC Studio comprises eight separated units, resembling sound stages used by the cinema industry. The Austin Company, engineers and builders.

National Broadcasting Company's first effort on the West Coast to provide centralized studios designed specifically for broadcast purposes, was the construction of a studio building on Melrose Avenue in Los Angeles. But, this new plant had hardly been occupied by the NBC staff in December of 1935 when it became evident that more space would be required to handle new demands for Hollywood shows. Plans to build an annex to the Melrose building were considered, but abandoned when it was realized that the site was not large enough for the size and number of theater studios needed. It was decided that a new location was necessary and survey crews were sent out to find it while preliminary plans were prepared for a new building based on estimated requirements of engineering and production heads.

An entire city block at Sunset and Vine, in downtown Hollywood, was finally selected and work of preparing final plans to fit the site and preparing details was started late in 1937. Although the floor plan and layout of the various studios were the most important factors in the planning, great consideration was given to both exterior and interior architectural details since the structure was intended to express its most modern function with beauty, dignity and showmanship.

Construction started in January, 1938 and progressed so rapidly that on October 2 the building was ready for occupancy, and on that day the first coast-to-coast program went out from the new studios. Because need for using the new facilities was so acute, NBC forewent the usual Holly-

*Manager of Technical Service, National Broadcasting Co., Inc.
†District Manager, The Austin Company.



A concrete terrace which opens onto each of the four large studios is illuminated by long colored neon lights in the canopy.

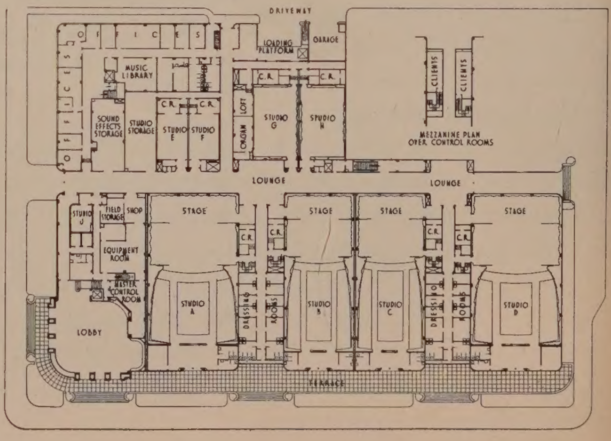
wood fanfare of searchlights and celebrities, and went to work without so much as a "house-warming" party.

Hollywood Radio City, occupying about half of a 4½ acre plot, comprises eight studios and a three-story office building. The layout is oriented from the three-story lobby which stands with its rounded corner and six tall glass panels in deep reveals at the corner of Sunset and Vine. To the left of the lobby unit, and facing west, is the office building which is 257 ft. long. This part of the structure houses executive, program, production, artists service, sales and other departments. To the right, extending 367 ft. is the studio facade which contains four "audience" studios, each a separate building with its own enclosing walls. This arrangement of individual studios is a modified adaptation of the motion picture sound stage system, but in this case each of the studios is joined to the adjacent building by glass brick walls, forming corridors between the studios. A terrace on the studio side of the building opens onto separate public entrances to each studio, a convenience that aids greatly in control of traffic. There are four smaller production studios without seating arrangements and two announcement studios.

The structure is a welded steel skeleton frame with architectural concrete walls. An exterior finish of blue-green not only reduces the glare of the famous California sun, but blends with the shrubbery and palm trees fronting the building. The concrete terrace wall, broken by voluted stairways, is painted a deeper green, while the floor of the terrace is concrete integrally colored with red pigment with joints ground in to simulate tile.

All the concrete walls are plain with smooth textures resulting from the use of plywood form liners. The architectural effect is achieved by the arrangement of masses, accented by rounded corners, a restrained use of aluminum trim at corners and on the canopy, and balanced areas of glass brick.

The architectural *tour de force*, of course, is the corner lobby motif, but here too, decorative treatment is chiefly confined to the interior. Dominant feature of the three-story high lobby is a 45x25-ft. mural depicting the "Spirit of Radio". Below this and continuing around the room is an aluminum architrave which conceals the indirect lighting system. Opposite the door an "invisible glass" window permits visitors to view the master control desk. Lightning



designs in the terrazzo floor radiate from the control board window toward the lobby entrances.

The four audience studios, which have a seating capacity of 340 each, were designed for the most modern application of sound control. Aside from the isolation, achieved by carrying the studio walls on separate footings, which avoids sound transmission, proper acoustical conditions are retained within each studio whether it is occupied or not. This is done by the use of heavily upholstered seats which are highly absorptive, and by the acoustical treatment of the rear and part of the side walls of the auditorium. In general the studio stage walls are covered with rockwool which is covered with perforated hardboard. This acoustical treatment together with heavy draw curtains provides necessary absorption to produce the proper reverberation period. The serrated, or "saw-tooth", walls and ceilings create sound dispersive effects which eliminate persistent reflections. Access to all studios is through "sound locks", or vestibules with doors closing to rubber stops at jambs and head, and movable rubber strip at the bottom which is forced down to contact the saddle when the door is closed.

Considerable attention was given to interior decoration and the use of color. Each of the four large audience studios is in a different color scheme with the colors graded from darker tones in the rear to lighter tones at the stage end. Each break in walls and ceilings created by the serrated design is a different shade of the same color.

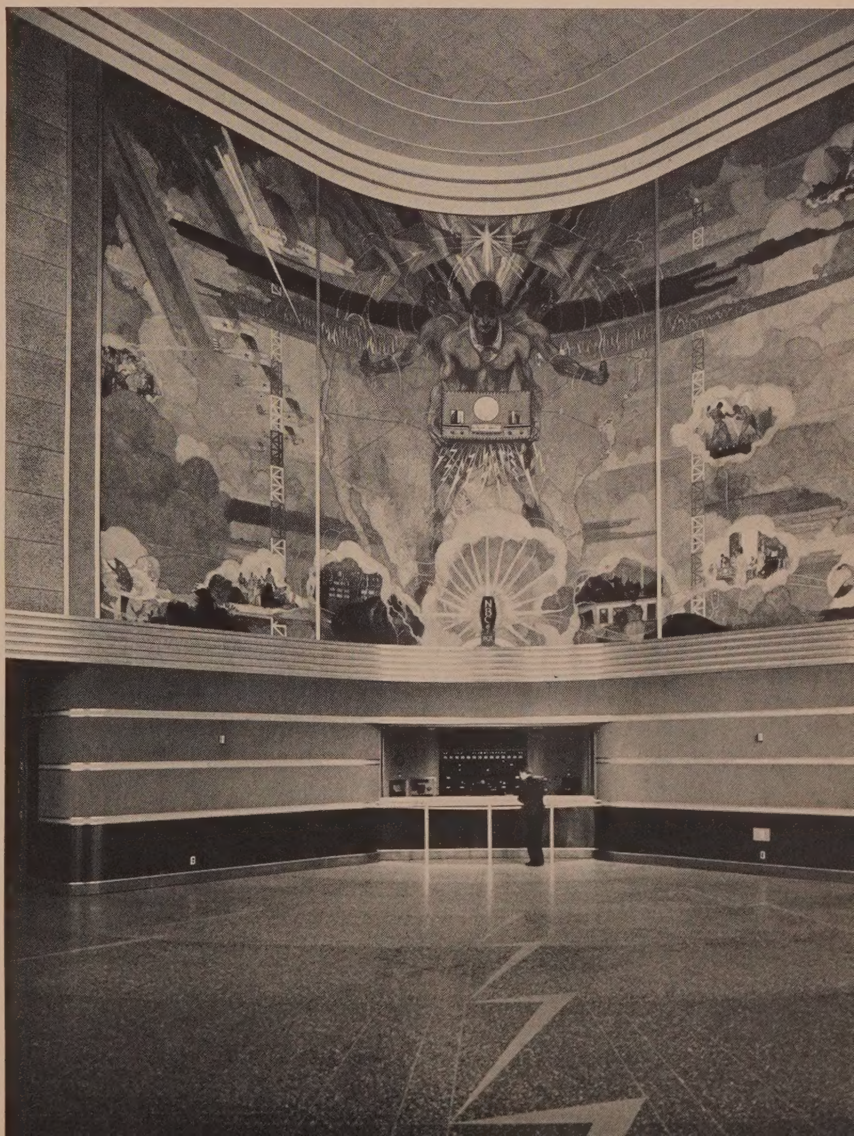
Exterior walls were placed in forms of 5-ply plywood except in a few places where plaster forms were used. The plywood panels, generally 3x8 ft. in size, were arranged horizontally. The circular corners were all placed against wood forms made up at the job out of ¾-in. strips nailed to circular ribs and lined with ¼-in. plywood. Plywood at these places was loosely tacked in place so that when concrete was cast against the facing the form liner would take the shape of the backing and not stretch from row to row of nails giving the appearance of a polygon. Care was taken not to set nails used in building forms, or to leave hammer marks, since these thoughtless practices produce unsightly bumps on the finished surface.

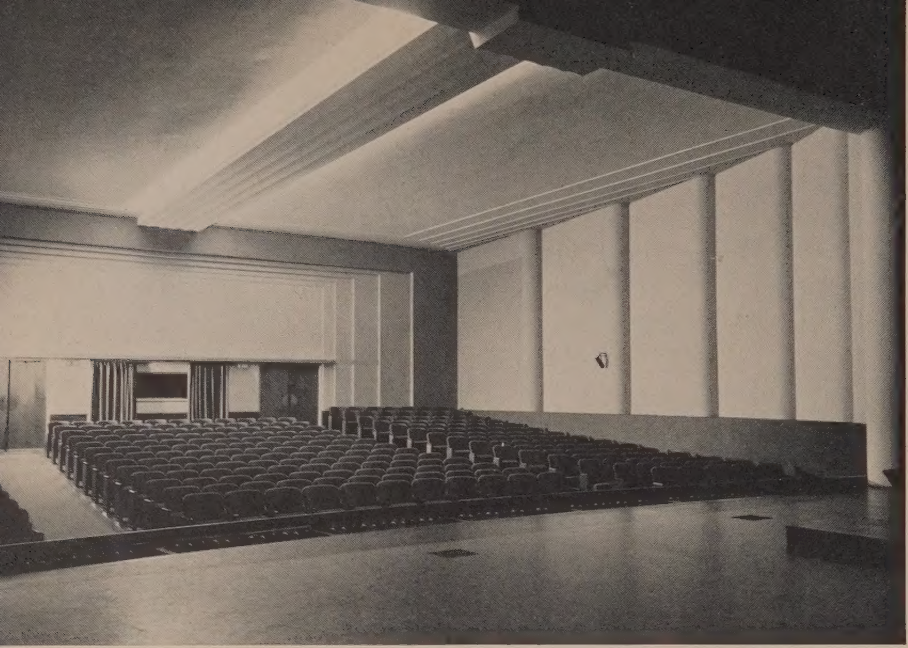
Plywood used for forms was treated at the mill with a coating of 25 per cent white lead and 75 per cent linseed oil, by weight. This helped to prevent raising of the grain when the plywood was wetted by fresh concrete, thus preventing grain marks from showing on the surface. Studding was placed 12 in. on centers to eliminate deflection of the plywood under the pressure of the concrete with consequent wavy surfaces after stripping. Such care was given to lining up the joints of the plywood that they show very slightly in the finished wall.

Most of the walls are 8 in. thick, reinforced with two curtains of ½-in. round bars on 18-in. centers horizontally, and with ⅜-in. round bars on 18-in. centers vertically. This reinforcement was placed 1¼ in. from each face of the wall.

The concrete for the building was approximately a 1:2½:3½ mix, the exact mix being set from time to time by a testing laboratory. In general, from 5½ to 5¾ sacks of portland cement were used to a cubic yard of concrete, and moisture content of the aggregate was taken into account in ascertaining the amount of added water. All concrete strength tests ran over 3,000 p.s.i. at 28 days. Slump for the wall concrete was set at 4 to 5½ in.

The three-story lobby presents a giant mural representing the spirit of radio. Lightning designs in the terrazzo floor direct visitors' attention to the central control board which is viewed through "invisible" glass.





Serrated walls and ceilings in all studios aid in sound control. Acoustical treatment of stage and auditorium walls provides necessary absorption to produce proper reverberation period.

Concrete was placed in the walls by means of "elephant trunks" or tremies, and heights of each lift were limited to from 8 to 12 ft. Greater heights might have been placed had it not been for interference of reinforcing steel. The concrete was consolidated by vibration using small electric jack hammers on the outside of the forms.

Wherever possible, horizontal construction joints were worked out to coincide with some architectural feature of the building. However, with the large expanse of blank walls, this was not always possible and in such cases a temporary 1x2-in. horizontal screed strip was nailed inside the form to give a horizontal line. The concrete was placed ½ in. above the bottom of the strip and about one hour after the concrete was placed the strip was removed and any irregularities in the joint line were leveled off with a screed.

About 3 in. below the top of each lift of concrete, ⅜-in. threaded rods with a nut imbedded in the concrete were provided at 2-ft. centers with which the forms for the next lift could be pulled tightly against previously placed concrete. Absolutely tight joints were produced by this means. There was no offsetting of the surfaces at the joints and no leakage of grout to discolor the concrete below.

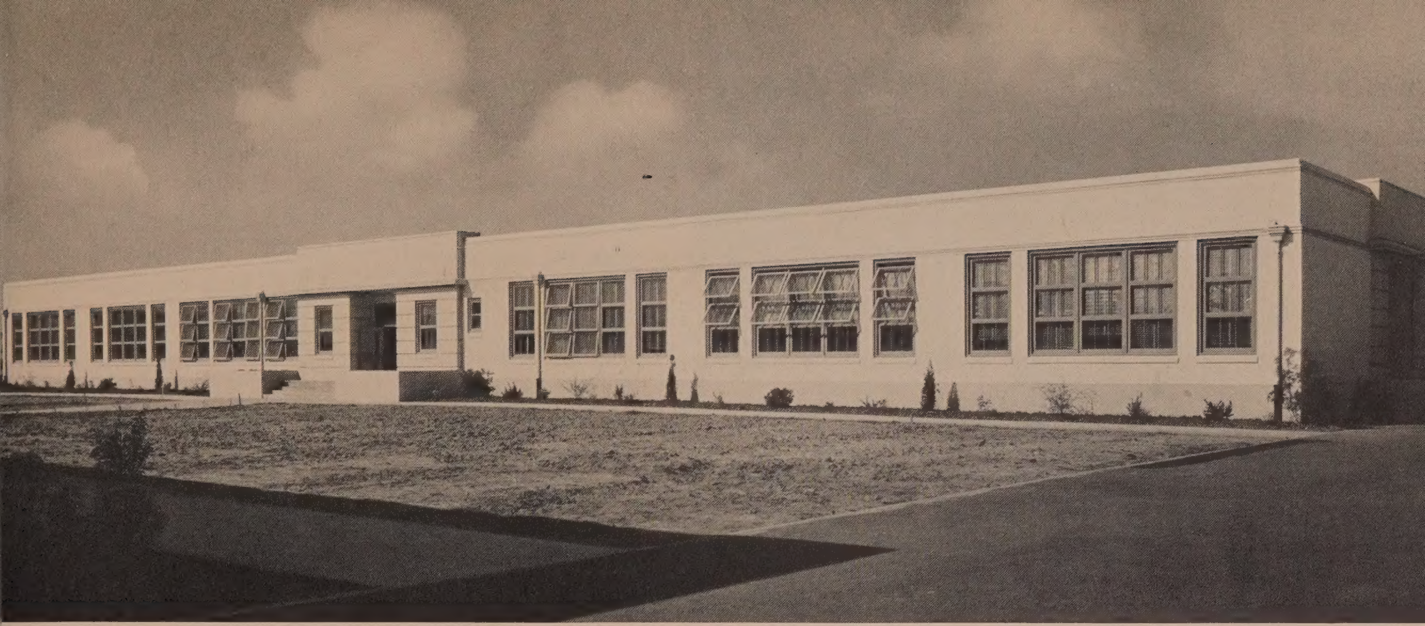
A form tie that could be entirely withdrawn from the concrete was used and the holes that were left were filled with cement grout. A cement grout gun similar to an alemite gun was used for filling the holes.

The long frontage of the building—about 300 ft. on the south side—necessitated the introduction of numerous joints in addition to those caused by the isolation of one part of the building from another for sound transmission reasons. In order to control cracking in a large expanse of concrete wall, experience has shown that these weakened plane joints* should not be placed over 20 ft. apart, and wherever possible, should be placed in the center of bays or points of zero shear where they cut a member of structural importance. These joints were made by putting small vertical metal strips in the forms which project into the wall about ½ to ¾ in. on both sides and leave an exposed joint about ¼ in. wide. The joints weaken the wall to a slight extent so that any temperature cracks will form at these locations and be invisible and guided in a predetermined direction. There is enough movement at the joints so that, where plaster is applied directly to the inside of the wall, a plaster bead should be provided on the line of the joint to prevent an irregular crack. On the outside of the wall these joints are filled about half with mastic to prevent leakage.

Before paint was applied to the exterior, the wall surfaces were carefully cleaned down with stiff wire brushes to remove dust and surface film. This was followed by application of a wet mix of portland cement and very fine sand which was allowed to partially set and was then rubbed off with a gunny sack leaving any small air bubble holes filled with the grout. The result was a very smooth, hard surface. When the concrete was thoroughly dry, two coats of oil base stucco paint in the blue-green tones mentioned before were applied.

Hollywood Radio City, with its broad horizontal plan, its isolated studios, perfected acoustics and complete air conditioning, is a radio engineer's dream of an ideal broadcasting plant. In designing the building NBC engineers, headed by O. B. Hanson, vice president in charge of engineering, were given their first opportunity to plan what they considered an ideal studio arrangement. Through close cooperation of all concerned and by careful interpretation of the plans, the project was completed to the entire satisfaction of designers, builders and to those who in the final analysis are the real judges, the operating personnel engaged in production of broadcast programs.

*See "Experience with Weakened Plane Joints" by Wm. T. Wright, this issue, pages 7 to 10; also "Weakened Plane Joints", ARCHITECTURAL CONCRETE, Vol. 5, No. 1, pages 18 and 19.



group of six school buildings at Montebello, Calif., were all designed with weakened plane joints. As this photo shows these vertical joints at the center of h window bay are virtually invisible from a short distance. Designed by T. C. Kistner, architect. William T. Wright was structural engineer.

Experience with Weakened Plane Joints

By William T. Wright*

SINCE the fall of 1937 weakened plane joints for controlling the shrinkage cracks in concrete walls have become widely used in Southern California and other parts of the Pacific Coast. The use of these joints started, to the best of the writer's knowledge, with a school building at Bellingham, Wash.; jumped to Los Angeles County, and since then has spread considerably to other cities on the Coast. Some of the 19 structures in Southern California, in which the writer has incorporated the joints, are school buildings at Montebello, Placentia, Anaheim, Topanga Canyon, San Juan Capistrano, Los Angeles and San Diego. Others are five new barracks buildings at San Diego for the Marine Corps Base, Navy Department. The joints have also been used by other architectural firms on several large buildings in Los Angeles and vicinity.

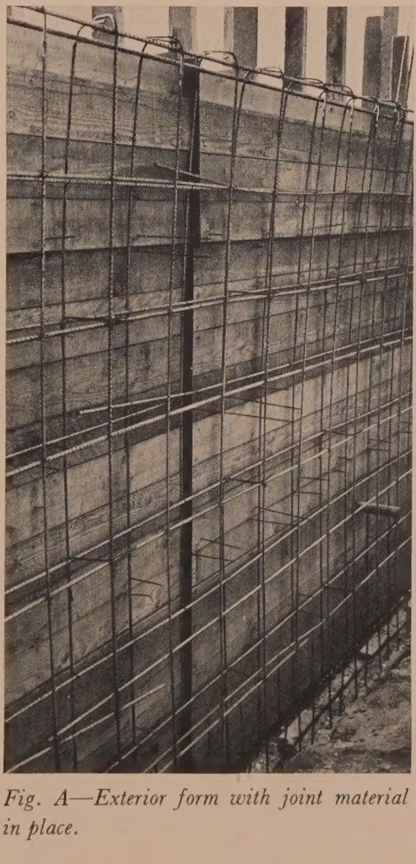


Fig. A—Exterior form with joint material in place.

The principle of weakened plane joints is no different from that used in construction of modern concrete pavements and properly installed concrete sidewalks.

Recent tests show the shrinkage in concrete is more or less proportional to the amount of water used in the mix. However, water cannot be eliminated entirely and workable mixes must be obtained. In using the joints described herein, it is recognized that we must have shrinkage and the best thing to do is to try to conceal the location of the cracks resulting from it.

Work along this line has just been started, and none can say just where these joints should be located. One engineer has come to the conclusion that they should be placed at the sides of all openings in the walls, thus probably eliminating all chances of the "window corner crack"; others have varying ideas. The writer has

*Structural Engineer, office of T. C. Kistner, architect, Los Angeles.

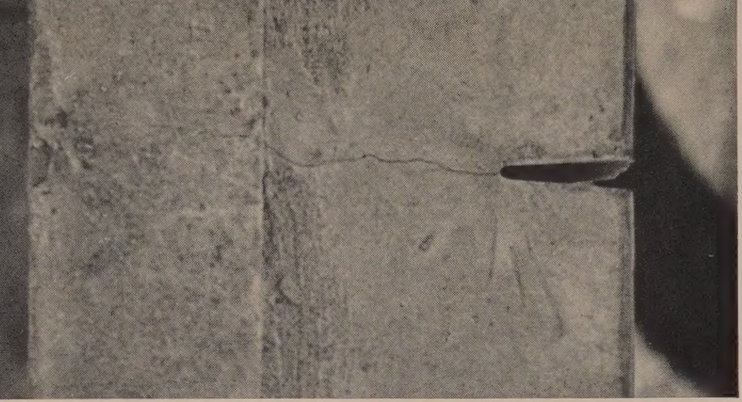


Fig. B—Note crack across top of wall from the joint at right.

thus far formed no definite opinions, but has tried several methods and hopes to obtain some interesting data from all of them.

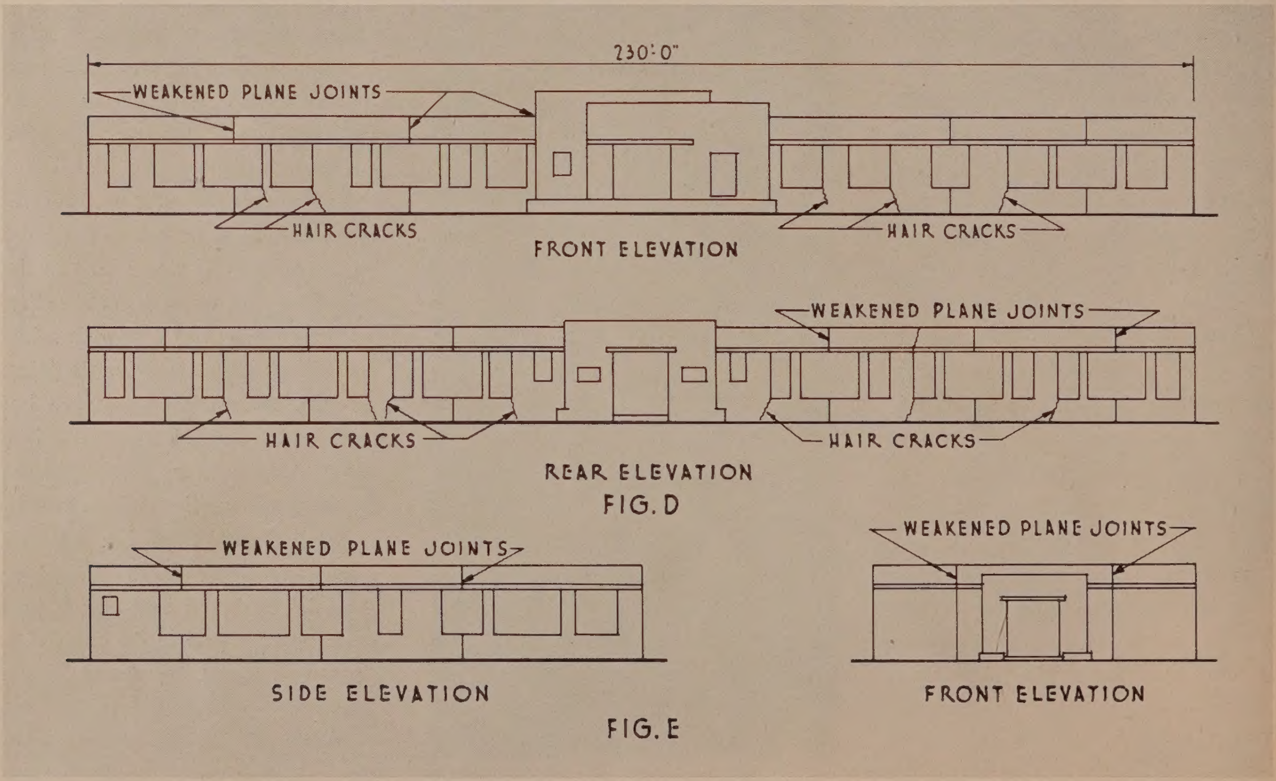
The writer's first experience with weakened plane joints was in the design and construction of six school buildings at Montebello. These buildings have exposed concrete exterior walls, and the interiors are plastered directly on the concrete. The detail used was that shown in Fig. 4*. First results were very gratifying in that every joint opened and no intermediate cracks in the concrete walls occurred. Fig. A shows the exterior form with the joint and reinforcing steel in place ready for inside form, and Fig. B shows the wall stripped and the crack visible across the top of the concrete.

Fig. C shows the location of the joints at the center lines of windows. After the wall had been placed for several months, small hair line cracks appeared in the locations indicated in Fig. D. It will be noted that these cracks occurred in the corners of windows adjacent to the wide, solid wall sections, while the joint had been placed at the center of the group of windows. It is interesting to note that there were two identical buildings constructed on separate sites, and that the cracks occurred in the same locations in both buildings. From this it was assumed that if the joints had been placed at the window adjacent to the wide solid wall section, the cracks could have been prevented.

This latter theory was carried out in subsequent designs of school buildings at Placentia, San Diego, San Juan Capistrano and Los Angeles, and to this date no cracking has been found. The joints in one of the Placentia schools were located as shown in Fig. E. Details of the joints were the same as used in the Montebello schools (*refer to Fig. 4**).

Two recent designs, San Diego and Los Angeles schools, have incorporated the weakened plane joints along with architectural details on the exterior of the building. The detail used was as shown in Fig. 6*. Where plaster walls occurred at the inside of the building, a metal plaster bead was added over the wood strip as in Fig. 5*. This plaster bead improved the appearance on the inside of the building since a crack has always occurred in the plaster at the joints.

*For Figs. 4, 5 and 6 mentioned in this article, refer to ARCHITECTURAL CONCRETE, Vol. 5, No. 1.



Figs. D and E.

The type of mastic used to fill the joints should be carefully selected to be sure that it is non-staining and will not shrink or "run". Also, the mastic should be kept back from the face of the wall for better appearance and to avoid smearing. In some cases, where the mastic has shrunk away from the sides of the groove, water has leaked through the wall, thus staining the plaster on the inside of the building. The writer is, at this time, designing two structures in which a copper dam as shown in Fig. F is to be installed. The copper is to be punched with small holes for wiring to the reinforcing steel. In using this method the mastic is not of great importance since the copper should eliminate any possibility of leakage.

In all cases, the W-P joints (which is probably what they will come to be called for the sake of brevity), should be carried over the top of all window sills and parapet walls and calked to avoid water leaking in at these points. Some engineers have cut a portion of the horizontal reinforcing steel at the joints. The writer has not done this, and has

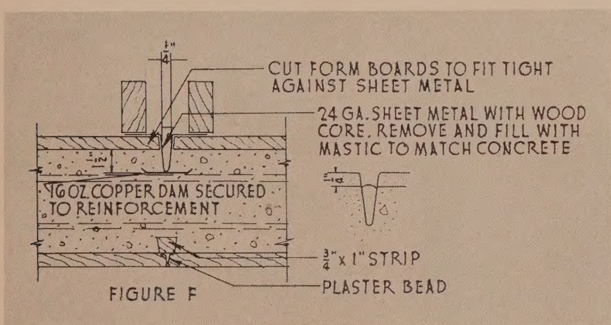


Fig. F.

found that the joints open up just the same. However, cutting a portion of the horizontal steel would further weaken the wall, and thus increase the probability of the joint opening up.

Where the walls in question are thin with heavy pilasters at intervals, I have placed the joints in the thin wall section midway between the heavy pilasters. The method has proved satisfactory where the intervening walls were not over 20 ft. long. Where there is more than 20 ft. between pilasters, the W-P joint has been placed in the corner where the wall and pilaster meet. In the latter case the detail in Fig. G has been used. Where steel columns are encased in concrete walls or pilasters, the column forms a weakened plane in itself, and the use of these joints at such places eliminates the irregular cracks in the wall which frequently occur. In some cases the joint has been placed at either side of the concrete pilaster encasing the column, and in other cases has been placed at the center of the column.

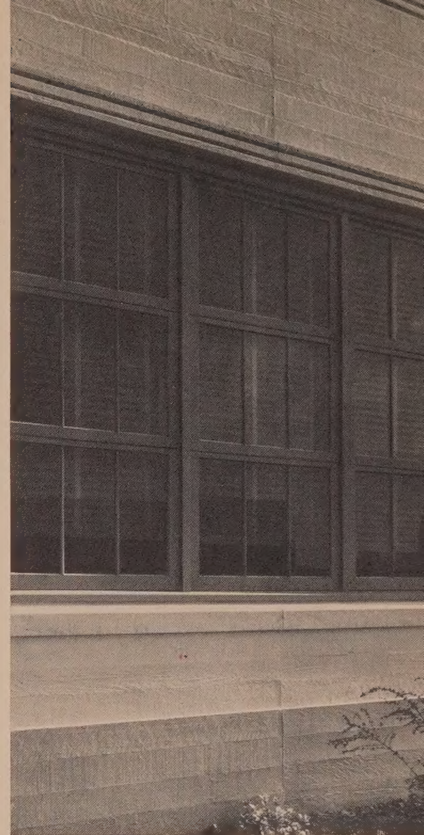
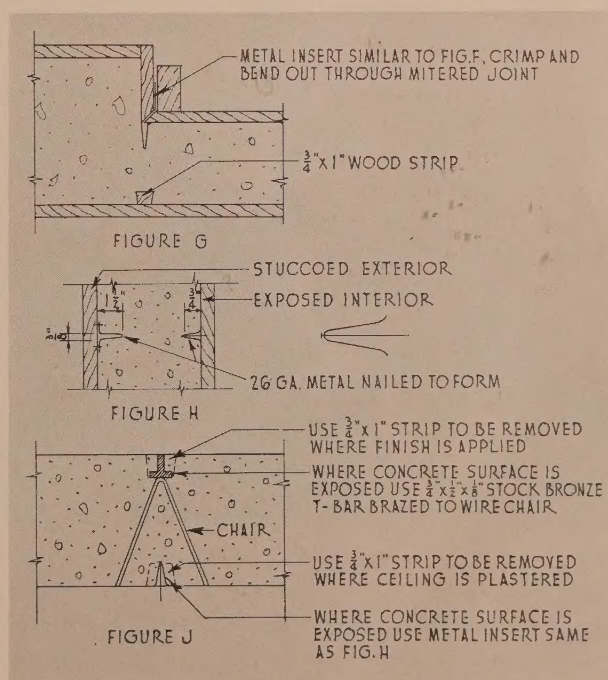


Fig. C—The joint in the wall shows as an inconspicuous trace.

In the barracks at San Diego, where the exterior walls have a stucco finish and the interior is simply the exposed concrete, the detail shown in Fig. H was used. Here no wood filler was employed in either the exterior or the interior joint. The exterior joint was a full 1½ in. deep and the metal strip was tacked to the face of the form. For the interior joint, the metal was formed as shown in Fig. H and secured in place with the small nail through the center of the strip. The slight bend in the metal where it contacts the surface of the form allows for driving the joint up tight and so insures a neat finish line. Where the joint is only ¾ in. deep, this method proves satisfactory.

Where the concrete floor slabs are left exposed both on



Figs. G, H and J.

top and bottom, as they are in the barracks buildings, some joints should be used in the floor to control cracking. In most cases I have observed, cracks do occur in large slab areas and they are unsightly in the finished job. The detail used in the Marine Barracks is that shown in Fig. J where the stock bronze ⊥ bar is set flush with the finished concrete surface and supported on galvanized metal chairs of special construction. The same metal joint was used in the ceiling under the bronze ⊥ bar that was used at the inside of the concrete walls. Where these slabs are employed as horizontal diaphragms in design for lateral forces, short diagonal bars should be placed at the joints to insure transmission of the horizontal shearing stress through the weakened plane.

To date, not enough information is available to determine exactly where W-P joints should be placed or to what extent they should be used. However, it is generally accepted that there is a distinct advantage in being able to control the location of cracks even if a few additional minor cracks do occur. The joints may or may not be used in connection with the architectural features of the building design, according to the architect's wishes.

Our office has incorporated weakened plane joints in all of the concrete buildings designed in the past year and a half, and it is believed that some advancement has been made in their use. From the writer's observations, it would seem that these joints should be used: (*a*) at openings, either side of wide solid sections of wall, (*b*) in all panels between pilasters thicker than the intervening panel walls, (*c*) in the exposed concrete surfaces where steel columns are cast into concrete walls, (*d*) in large wall areas at intervals of from 15 to 25-ft. spacing, and (*e*) in large exposed floor slab areas at intervals of 15 to 25 ft., such joints being placed in line with the wall joints. The exact location in any case must depend on the actual design of the structure.

•

East Carroll Parish Courthouse

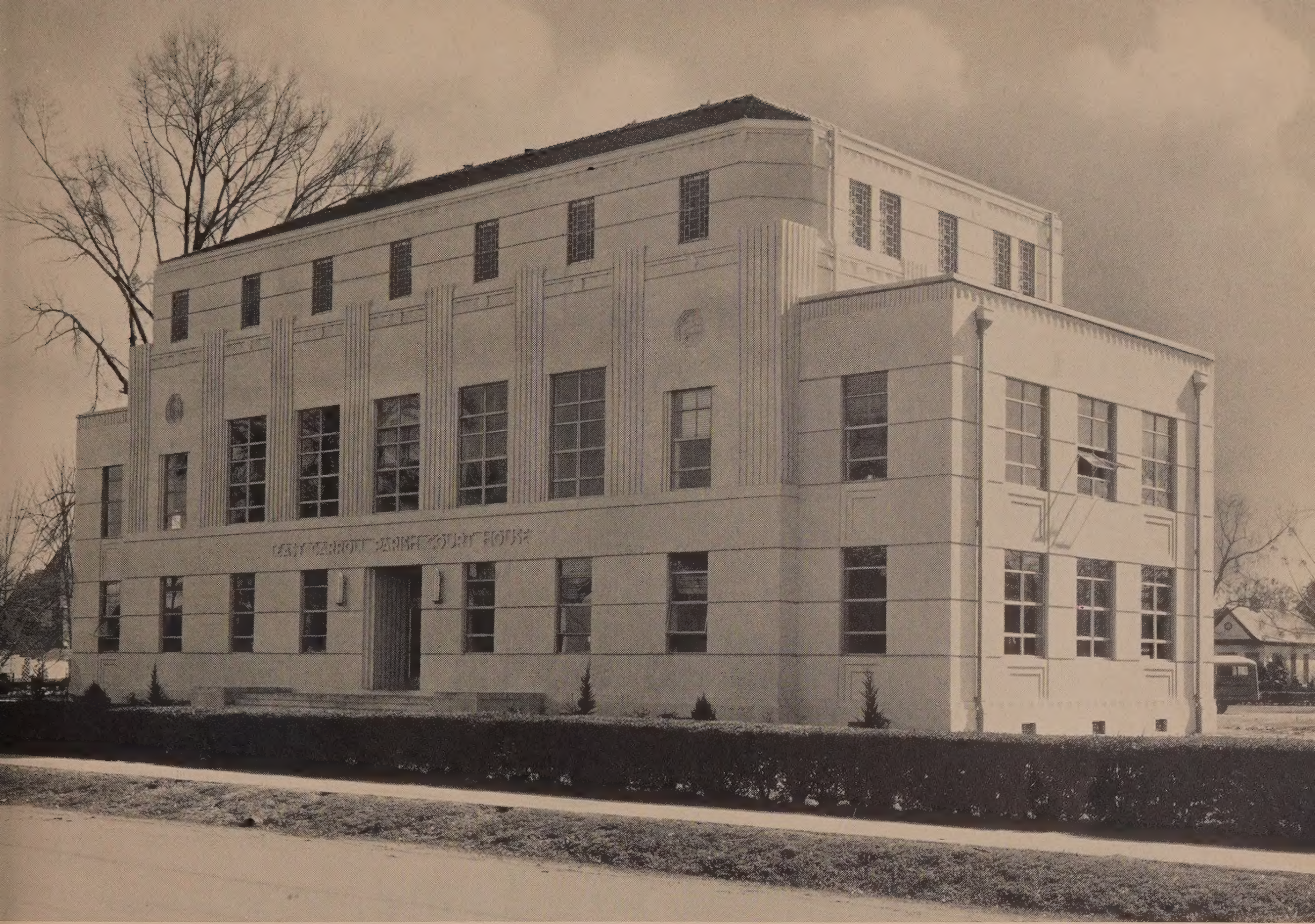
By Merl L. Padgett*, A.I.A.

Concrete was selected for East Carroll Parish Courthouse, Lake Providence, La., so that the anticipated design could be executed economically. J. W. Smith & Associates, architects, Monroe, La.; M. T. Reed Construction Co., contractor of Belzoni, Miss.

LOCATED on the shores of a beautiful lake in the richest cotton belt in the Southland is the town of Lake Providence, La., seat of East Carroll Parish. The growth of this unusually progressive agricultural community, which now numbers 3,000 people, had made obsolete the old courthouse and jail facilities which were built more than 40 years ago. To keep abreast of modern requirements a new building was authorized last year.

Space in the new building was needed for a jail, a court

*J. W. Smith & Associates, Monroe, La.



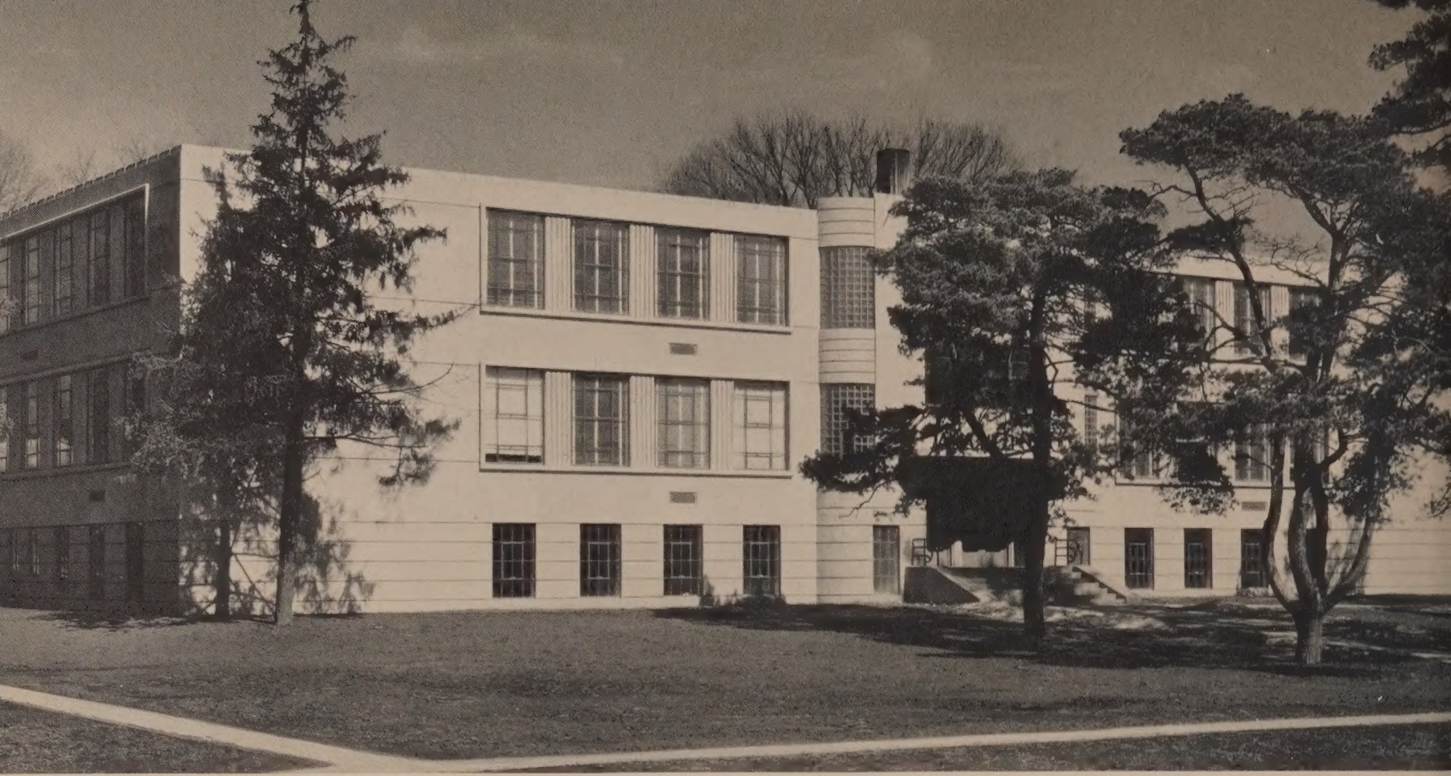
The design is modern-classic, with rather restrained use of ornamentation. Most of the decorative details were formed against milled wood, although some plaster waste molds were used.

room, an assessor's office, sheriff's office, clerk of court offices and other departments incidental to the court. The appropriation authorized was made on the basis of 55 per cent of the total cost of the building, since a grant of 45 per cent had already been made by the federal government for the work. The total appropriation amounted to approximately $90,000; but it became apparent that, without scaling down required accommodations and greatly modifying the envisioned design, this sum would be insufficient. An alternative to this was to select a type of construction that would be more economical than that first anticipated.

Architectural concrete was considered, and a cost survey of buildings erected with this material was made. Careful study revealed that architectural concrete could produce the type of building desired in so far as appearance, structural soundness and space requirements were concerned, quite within the spending limits of the project. In the course of this study, other advantages of using concrete became apparent. Due to climatic conditions in the Gulf region, it is somewhat difficult to obtain waterproof walls with ordinary building materials within reasonable costs. Since a definite characteristic of concrete walls is their waterproof quality, this was a large advantage and could be obtained at considerable saving. The decision to use architectural concrete was also influenced by the belief that concrete was a more appropriate medium for execution of the modern classic design of the building.

The successful bidder on the project was the M. T. Reed Construction Co. of Belzoni, Miss., at a figure of $90,933. The courthouse and jail building was constructed under the supervision of Charles H. Hill, superintendent for the architects, and Jesse L. Barnette, contractor's superintendent.

From the standpoint of direct comparison in costs, the East Carroll Parish Courthouse was built at a cost of 36 cents per cubic foot against a cost of 45 cents per cubic foot on another courthouse of approximately the same size, but constructed of other materials in a town nearby. It is the feeling of the architects and the sponsors of the project that use of architectural concrete was not only the economical solution to the problem, but a most pleasing one as well.



Reasoning that concrete being good enough for bridges and power plants, and economical to construct, it should be fine for schools—the Board of Education at Tama, Iowa, decreed architectural concrete for this new building. Thorwald Thorson, architect, Forest City, Iowa; James Thompson & Son, contractor, Ames, Iowa.

New School for Tama, Iowa

By Thorwald Thorson, A.I.A.

THERE seems to be a widespread notion abroad among school boards of the Middle West that reinforced concrete is an excellent material for the exterior walls of a school building in California or Texas, but that it is absolutely unsuited for the cold winters of the northern states. Just why this material should be acceptable for industrial buildings and power plants, and not for schools, is difficult to explain. One reason, perhaps, is that the typical school board, together with educators, tend to be conservative and prefer to repeat what has already been done in the neighborhood. School architects are familiar with the common procedure of a school board making a trip to see the neighboring new buildings, and then instructing their architect exactly how their building should be planned. The average taxpayer who has no information as to the merits of architectural concrete, comparing it in his mind with inferior concrete work which he has seen, may also express his opposition to this material before the board members. It follows, naturally, that even though the board members themselves are convinced that the material is desirable, they seldom wish to take matters into their own hands and prove to the community the wisdom of their action in using reinforced concrete.

The school board at Tama, Iowa, did not proceed in this manner. They reasoned that if concrete is good for a bridge or a power plant, why not for a school? Instead of visiting other school buildings, they went to see the new reinforced concrete home built for Earl Butler at Des Moines in 1936. This, together with other concrete structures observed, satisfied the board members that concrete can really be used to advantage in this climate. Since each of the members was satisfied with the material, they had the courage of their convictions to proceed with the building. Now they are happy in the knowledge that the entire community is intensely proud of the new structure.

The actual planning of the building was left almost entirely to the office of the architect and to the superintendent of schools, E. H. Nelson. Because of a sincere striving for economy in plan arrangement and use of material, a building of very reasonable cost resulted.

It should be understood at this point that I am not advocating a wholesale and immediate change from brick to concrete. If designed correctly, both are excellent and suitable materials for school buildings. The choice of one over the other should depend on a great number of things—but original cost, maintenance expenditures, availability of materials, and harmony with surrounding structures should be especially considered. Under any circumstances it is imperative, to my mind, that the two types of construction be completely compared in an unprejudiced manner before a decision is finally reached.

The plan of the Tama school is not at all unusual. It is the result of a definite attempt at economy through a compact, workable scheme which makes maximum use of the material selected. From the preliminary sketches to the final working drawings, a conscious effort was made to produce the largest number of usable cubic feet with a minimum of cost. With this in mind the exterior was kept extremely simple, using fluted piers between windows, projecting bands around window areas, and horizontal rustications as the only relieving features. A lively green was used on all windows and exterior doors to create more color interest, and black free-standing iron letters were placed over the front marquee to give an additional modern accent. Venetian blinds for the windows also add to the color effect.

The modern design was kept extremely simple, using fluted piers, projecting bands and rustications to relieve plain wall areas.

The structural development of the building produced several interesting features. Walls of the basement story were made 10 in. thick with a single curtain of reinforcing in the center of the wall. Walls of the upper two stories were made 8 in. thick with similar reinforcing. After careful investigation the concrete floor slabs, which were formed with removable steel pans, were designed to be continuous with the wall. A rigid connection between the two has the double function of reducing the thickness of floor slab and the amount of steel, and of producing a structure that is highly resistant to severe shock. This permitted reducing the regular floor slabs 2 in. in depth and made possible a considerable saving in cost. The risers in the balcony of the auditorium were made of steel, with concrete-filled treads on which are placed seven rows of opera chairs. The steel work is in turn supported by several large concrete beams which cantilever out 20 ft. from the rear wall of the auditorium. These beams are carried across the corridor at the rear and are anchored securely into the slab of the second floor classrooms beyond. This structural system eliminates entirely the need for objectionable posts in the auditorium.

The building was completed in rapid time at a general contract cost of \$104,600 or 16.1 cents per cu.ft. James Thompson & Son of Ames, Iowa, was the contractor.

Concrete beams cantilevered from the rear wall of the auditorium support the balcony.

A two-story concrete structure is the administration building at the American end of the new Blue Water Bridge at Port Huron, Mich. Designed by George L. Harvey and Norman B. Forbes, architects, all the buildings were erected by the H. G. Christman-Lansing Co., at a cost of $236,000.

Bridge Buildings—Port Huron

By George L. Harvey* and Norman B. Forbes*, Architects

A MIGHTY monument to peace and democracy, offering staunch proof that friendly, understanding and enlightened people still prefer to live in harmony with their neighbors, has been recently completed at Port Huron, Mich. This monument is the Blue Water Bridge, a long span which crosses the St. Clair River from Port Huron to Point Edward, Canada—a part of the direct, convenient and scenic highway between Chicago, the Middle West and Toronto, Montreal, Niagara Falls, Buffalo and the East.

Plans for a bridge across the St. Clair at this point were first evolved in the summer of 1927 after study of traffic movements indicated the financial soundness of such a venture. However, the first company formed to build the bridge with the permission of the Congress of the United States and the Canadian Parliament was not able to proceed with the work within the year allowed after approval was granted. An additional year, granted through the efforts of Representative Louis C. Cramton, was also forfeited, and the project lapsed for a time.

After consultation with Port Huron civic leaders in April, 1930, Representative Cramton, who was a firm believer in the bridge project, introduced a bill in Congress creating a Great Lakes Bridge Commission. This commission, however, turned down the project on the grounds that there would be financial loss to investors if the structure had to be financed only by revenue bonds. Since there was neither American nor Canadian federal money available at the time, the plans were dropped once more, although efforts to work out a feasible proposition were carried on ceaselessly by the late Henry R. Baird, Port Huron attorney.

These efforts culminated in tangible results when, in June, 1935, the Michigan State Legislature created a State Bridge Commission, authorized to build, maintain and operate a bridge between Port Huron and Sarnia, and to issue revenue bonds needed for the project.

*Architects, State Bridge Commission of Michigan.

The first commission was appointed with Mr. Baird as chairman and Varnum B. Steinbaugh, chief engineer of the State Highway Department, and Dale E. Moffett as members. At the death of Mr. Baird in May, 1936, Mr. Steinbaugh was made chairman and Marshall E. Campbell was appointed to fill the vacancy. This new commission worked brilliantly and successfully in negotiations with governmental bodies on both sides of the border to the end that on June 23, 1937, the first shovel of dirt was turned up at the bridge site by State Highway Commissioner Murray D. Van Wagoner.

Plans for the customs, immigration and administration buildings to be erected on the American plaza were made by George L. Harvey and Norman B. Forbes, and successful bidder on the plaza construction which included construction of these architectural concrete buildings, was the H. G. Christman-Lansing Co. at a contract figure of $236,362.70.

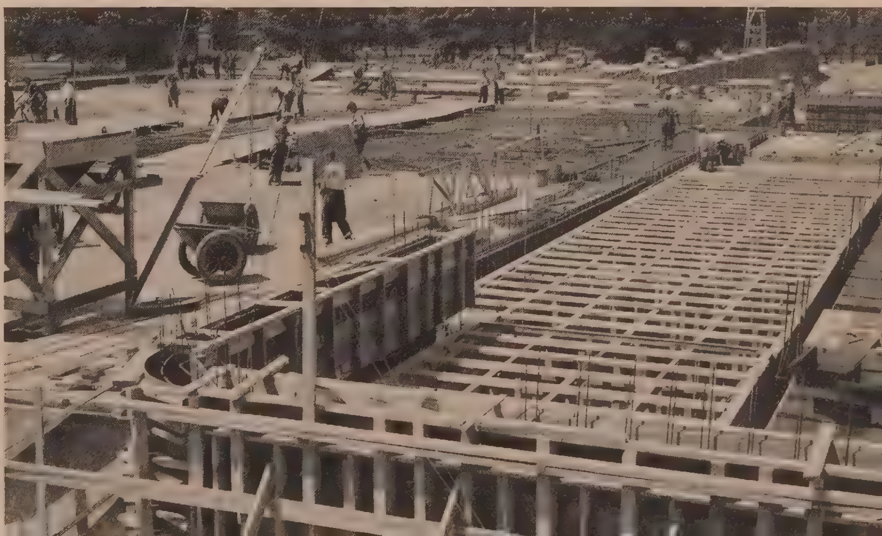
The buildings constructed at the American end of the bridge are an administration building, permit building, inspectors' booths and a small scale house. Largest of these is the administration building—113x39 ft.—which is joined with the truck cargo inspection building to form an L-shaped structure of two stories. The first floor, at grade level, contains offices and maintenance facilities in addition to quarters for the medical examiner, Board of Inquiry and men's and women's detention. The second floor, which is at the level of the plaza, provides mainly for customs and immigration facilities and includes a truck unloading area completely enclosed within the building for protection of perishable goods.

Architectural concrete walls of the administration building structure vary in thickness to provide ornamentation but are, in general, 14 in. for sections below the first floor, and 12 in. for the remainder of the wall from floor to parapet. The walls are reinforced with ½-in. round bars on 12-in. centers, vertically and horizontally, in both faces of the walls. Additional reinforcement was used around all openings. The 68-ft. portion of wall embracing the entrances from the plaza is faced with a black cast stone base 3 ft. 6 in.

On the plaza the eight toll lanes are served by four inspectors' booths which have black cast stone bases.

Rustications made convenient locations for construction joints and made them inconspicuous.

Careful formwork produced smooth surfaces and sharp detail. Three-quarter-inch plywood saw-kerfed at 1-in. intervals was bent to a 3-ft. radius to form round corners.



The truck and cargo building (extreme left) *contains an unloading area completely enclosed within the building for protection of perishable goods.*

high which was used as the outside form for the reinforced concrete at this point. Because the plaza at the site of the administration building is approximately 16 ft. above grade, a rather high first story was necessary, being 15 ft. 7 in. between finished first floor and second floor. The second story is 14 ft. 6 in. high. These high stories did not present a serious construction problem because it was possible to locate construction joints at the rustication lines and belt courses provided in the architectural design to some extent for that purpose.

The single-story permit building is 33½x18 ft. and is founded on the plaza slab. Its walls are 10 in. thick, reinforced like the administration building group.

The 9½x6½-ft. scale house also rests on the plaza slab, and has 8-in. walls reinforced with ⅜-in. bars horizontally and vertically in both faces.

Four inspectors' booths support the main canopy. These are faced with cast stone below the window sill lines, and are of 2-in. reinforced portland cement plaster above.

The architectural theme of all the structures follows the modern trend and a streamlined effect was obtained by rounding all corners on a radius of 3 ft. Walls were formed against ¾-in. plywood sheathing which was bent to form round corners by saw-kerfing the back. The dentil course and ornamental band were formed with wood molds. This wood forming, including the 1x2-in. rustication strips, was allowed to remain in contact with the wall concrete after sheathing was removed until it detached itself by shrinking.

Concrete used throughout the construction of the buildings was specified for a compressive strength of 3,000 p.s.i. at 28 days. The mix, designed by the Michigan State Highway Department, required crushed limestone having a toughness coefficient of six for coarse aggregate. The fine aggregate was required to contain from 3 to 7 per cent of sand passing the No. 100 sieve to insure good workability and prevent bleeding. The concrete proportioned with this material, in accordance with laboratory charts, had a high degree of workability. No difficulty was experienced in placing concrete with a slump as low as 2¾ in.

After the exterior walls were entirely completed they were cleaned with a cement grout. The grout was applied to the previously wetted concrete and immediately floated with a wood float, thus scouring the surface. When the grout had hardened slightly it was scraped off with the edge of a trowel and finally all excess grout was wiped off with burlap. This process left the small air bubble holes filled and the wall surfaces thoroughly cleaned ready to receive the portland cement paint.

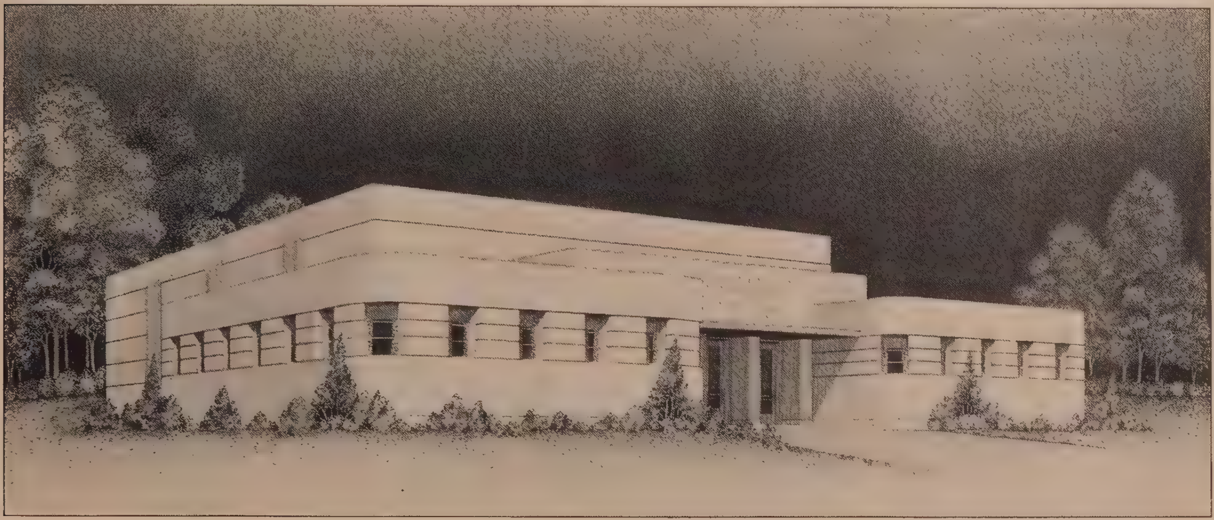
The interior walls are furred with 1x2-in. strips and finished with ¾-in. plaster on metal lath. No difficulty has been experienced from condensation during the past winter, indicating that the furring provided sufficient insulation for the climate of Port Huron.

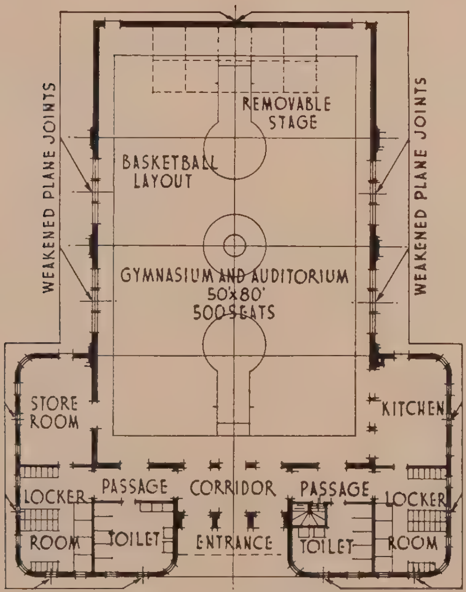
Construction of the American plaza and approaches, together with the architectural concrete buildings, was supervised by the Michigan State Highway Department with L. Bruce Henderson, project engineer, in charge. Homer Bair was superintendent for the H. G. Christman-Lansing Co.

Proper plans and specifications, excellent workmanship, capable supervision and a desire to cooperate on the part of all interested parties, resulted in architectural concrete structures of lasting credit to all. All connected with the development and construction of the project have expressed entire satisfaction with the results obtained on these bridge buildings.

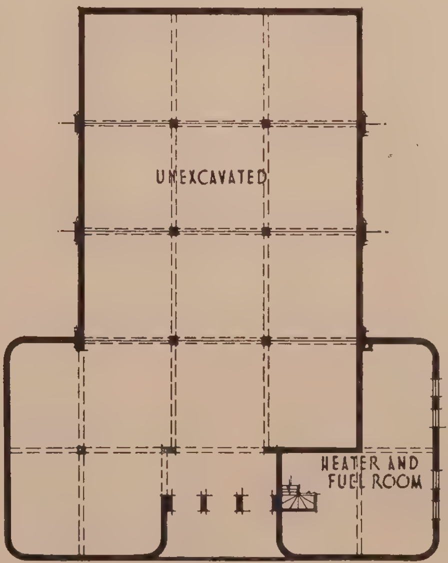
COMMUNITY BUILDINGS

Buildings erected by municipalities, from the largest cities to small villages, to house community activities are increasing in number rapidly. The facilities and space requirements depend to some extent on the size of the community, but certain features are indispensable. In the following pages buildings are shown which may be adapted readily to the requirements of cities covering quite a range of population.

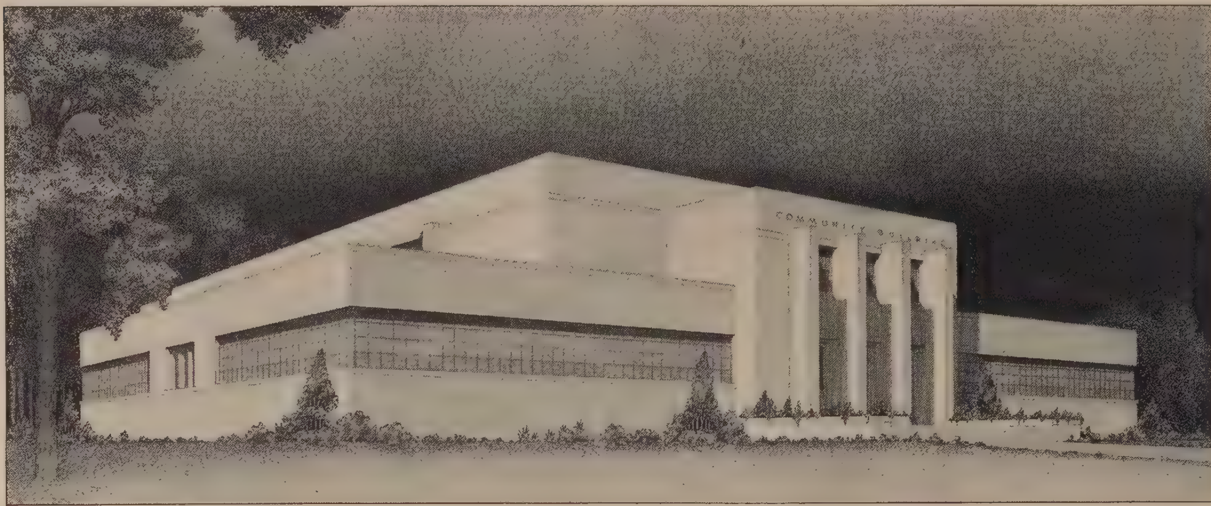


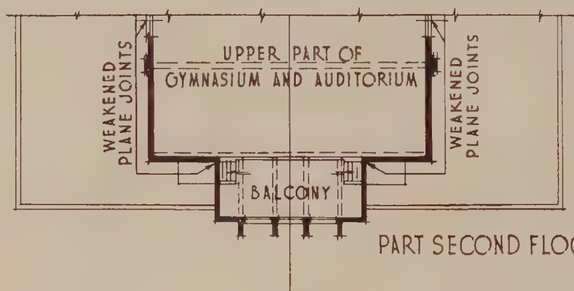


FIRST FLOOR PLAN

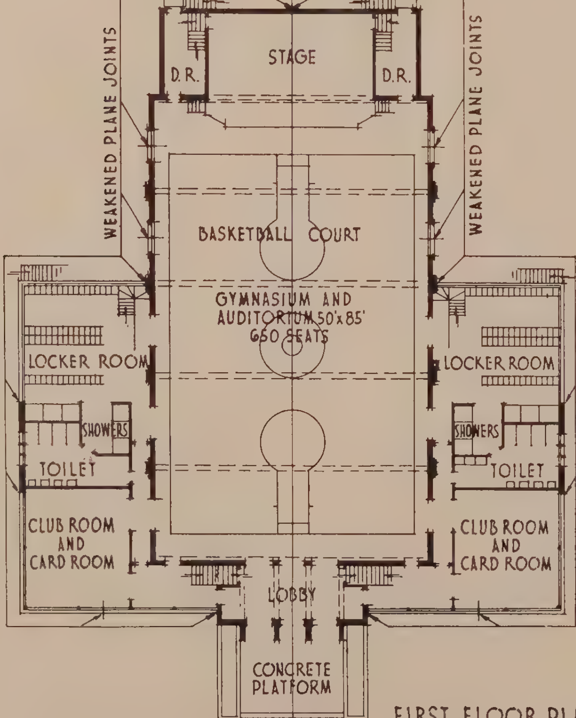


BASEMENT AND FOUNDATION PLAN

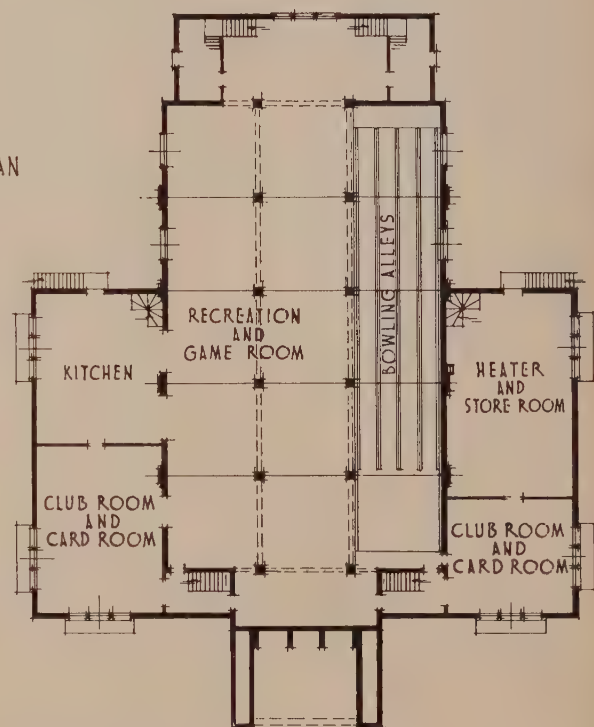




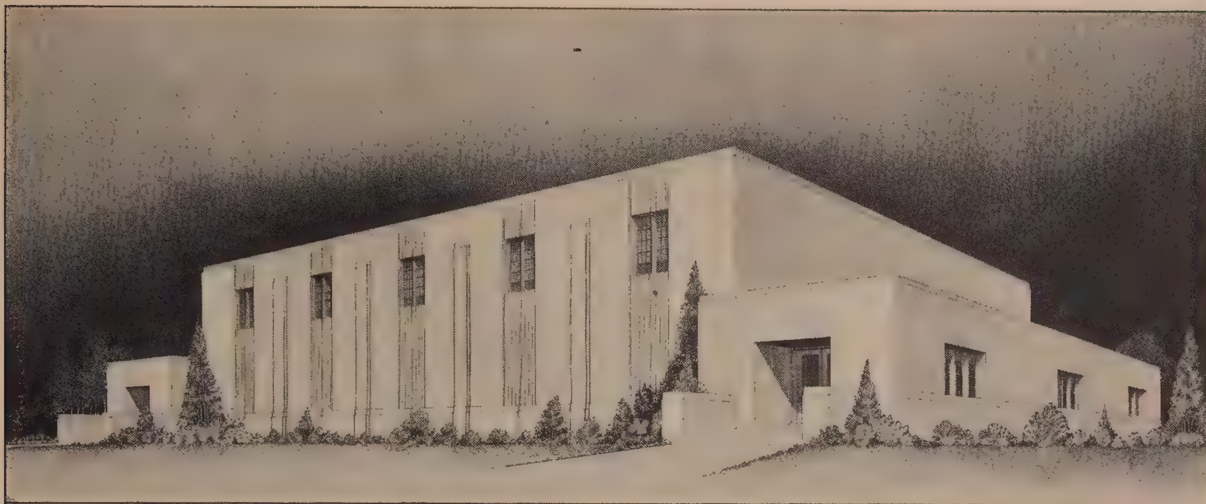
PART SECOND FLOOR PLAN

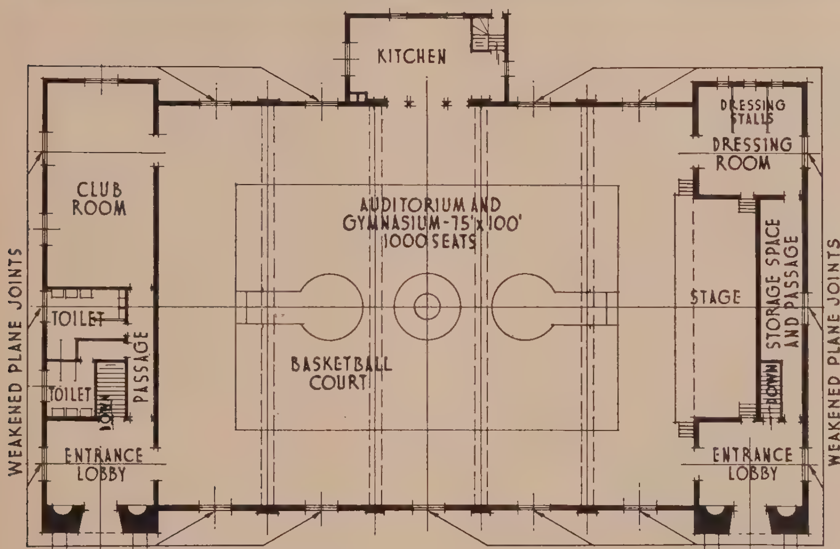


FIRST FLOOR PLAN

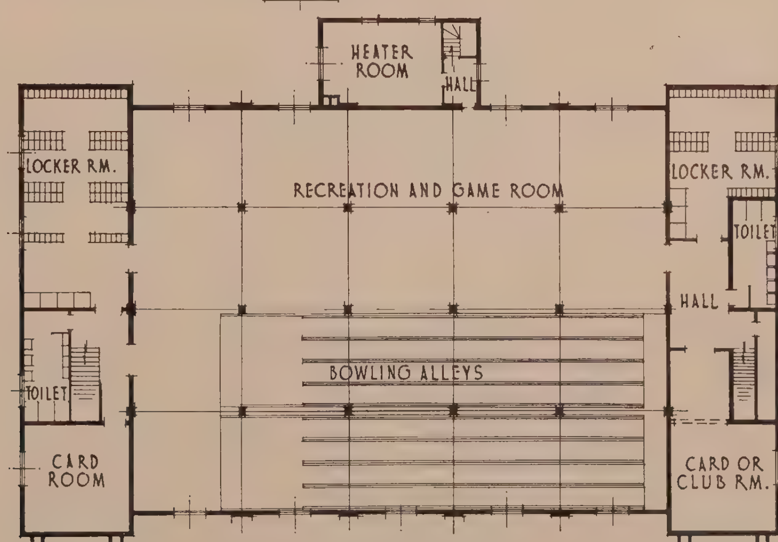


BASEMENT PLAN



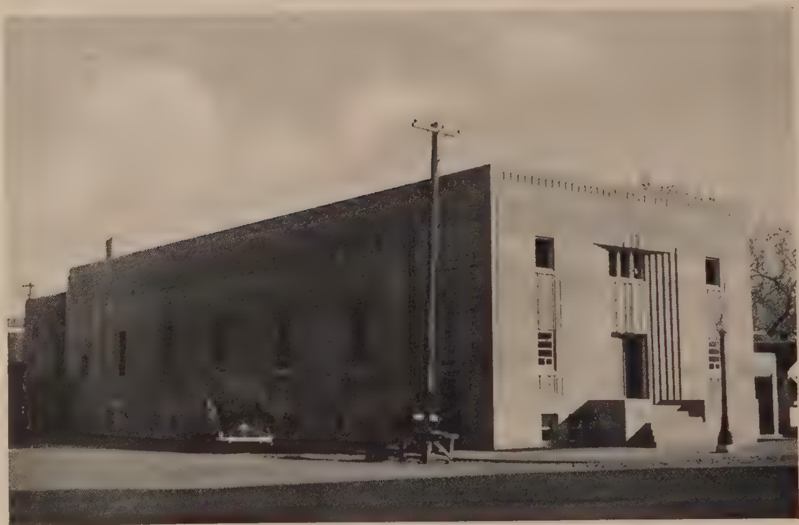


FIRST FLOOR PLAN



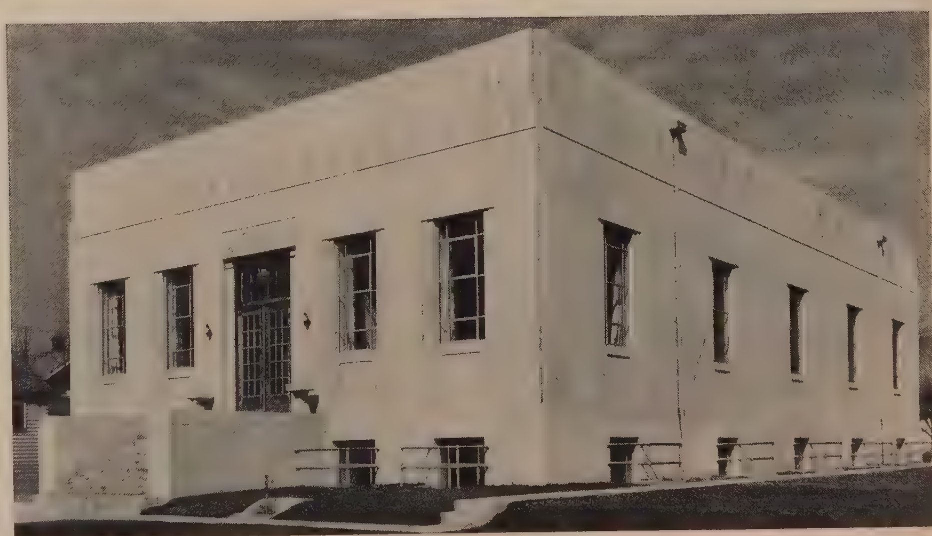
BASEMENT PLAN

COMMUNITY BLDG.
HOKAH, MINN.
KNUTSEN & BRUNET
ARCHITECTS
ROCHESTER, MINN.
BUILT BY W.P.A.



COMMUNITY BUILDING
AND CITY HALL
PARK RIVER, N.DAK.
DESIGNED AND
BUILT BY W.P.A.

COMMUNITY
CENTER
ANDERSON, IND.
ERNEST R. WATKINS
ARCHITECT
ANDERSON, IND.
BUILT BY W.P.A.



Published by Portland Cement Association • 33 West Grand Avenue • Chicago

Civic Center for San Diego

By Richard S. Requa, A.I.A.

[illegible] planning came true this year with the completion of San Diego's Civic Center. This beautiful architectural concrete structure houses city and county offices. It was designed by four architects: Louis J. Gill, Wm. Templeton Johnson, Richard S. Requa and Sam W. Hamill. Foundations and grading were done by WPA forces, and the superstructure was erected by B. O. Larsen, contractor.

An important date in the advancement of San Diego was March 8, 1926, when an election was held to determine whether future extensions and development of the city should be made to meet exigencies of the moment, or in accordance with a City Plan evolved after many years of intensive study by that eminent city planner, the late John Nolen of Cambridge, Mass. The City Plan was adopted by a large majority.

One of the most important elements of the plan was the civic center, a combination of city and county government buildings indicated in the plan as located on 18 acres of land reclaimed from harbor dredging, and fronting on the harbor. This property is not only immediately to the west of the central business district, but within walking distance of the airport, municipal piers and the Union Station. It is accessible from every part of the city and county on broad paved highways that avoid the congestion of the downtown district.

Possibly no city or county in the nation was in greater need of modern, adequate administrative quarters than San Diego. The old courthouse, erected in 1890 when the community was a village of 20,000, had long been outmoded and overwhelmed by new and necessary departments and offices so that many of the bureaus had, for years, overflowed to office buildings, remodeled stores and garages. Similarly the old city hall was an antiquated structure, so small that many important city departments had been forced to scatter to other quarters. It was estimated that the city and county spent $50,000 annually in rentals for space required for administrative purposes.

Due to the stringent financial conditions in the early '30's, no real headway was made toward improvement of the Civic Center until 1935 when the Works Progress Administration agreed to appropriate $989,527 for a city and county administration building on the site. The city and county contributed $105,600 as the sponsor's share

The west facade faces San Diego's harbor from which th
with a white portland cement wash.

and the Civic Center Committee started to work.

Plans and specifications were completed by Febr
1936, and a WPA project for excavating for foun
erection of construction facilities, driving of fou
piles and structural work on the foundation up to
level, was completed December, 1938, at a cost of $

From this point on, construction of the superst
was let by contract to the firm of B. O. Larsen at
of $627,069 for structural work, finished exterior, and roughing-in of plumbing, drainage, elevators, heating and other incidental items. This phase of the work was finished on January 10, 1938.

The main portion of the building extends north and south of the central tower which is the dominant architectural feature. Wings at either end extend to the east. Ultimately, similar wings may be built to the west forming an H-shaped plan when city and county growth requires additional space. The structure is 545 ft. long and 245 ft. across its widest section. Arrangement on the lot is such that there is ample space north and south of the building to permit erection of a hall of justice and an operations building, both proposed for future construction.

Architectural treatment of the exterior of the building is a pleasing combination of modern design with Spanish detail which definitely associates it with the historic architecture of the Southwest. Essentially an architectural concrete design, colored tile in interesting patterns has been used for covering the domes over the entrance to the wings, and for facing main entrances, borders around window groups and recessed panels in the top of the tower. Over

tions of the building rest on piles which vary in length from 32 to 35 ft., depending upon the depth of firm soil below the sand fill. A total of 1,521 piles, capped with concrete below water line and connected to form a continuous grid under each section of the building, form the solid, earthquake-resisting foundations. The tower foundation was placed on a bed of gravel and, after the foundation slab was placed, cement grout was forced under great pressure through holes in the slab to fill completely all voids in the gravel.

Except for the framing of the tile roof over the center portions of the building, the structure is entirely reinforced concrete—including all floor and roof slabs, interior walls and columns. The structural design, prepared by J. H. Davies, meets in every particular the stringent regulations of the state relating to construction of schools to resist earthquake forces.

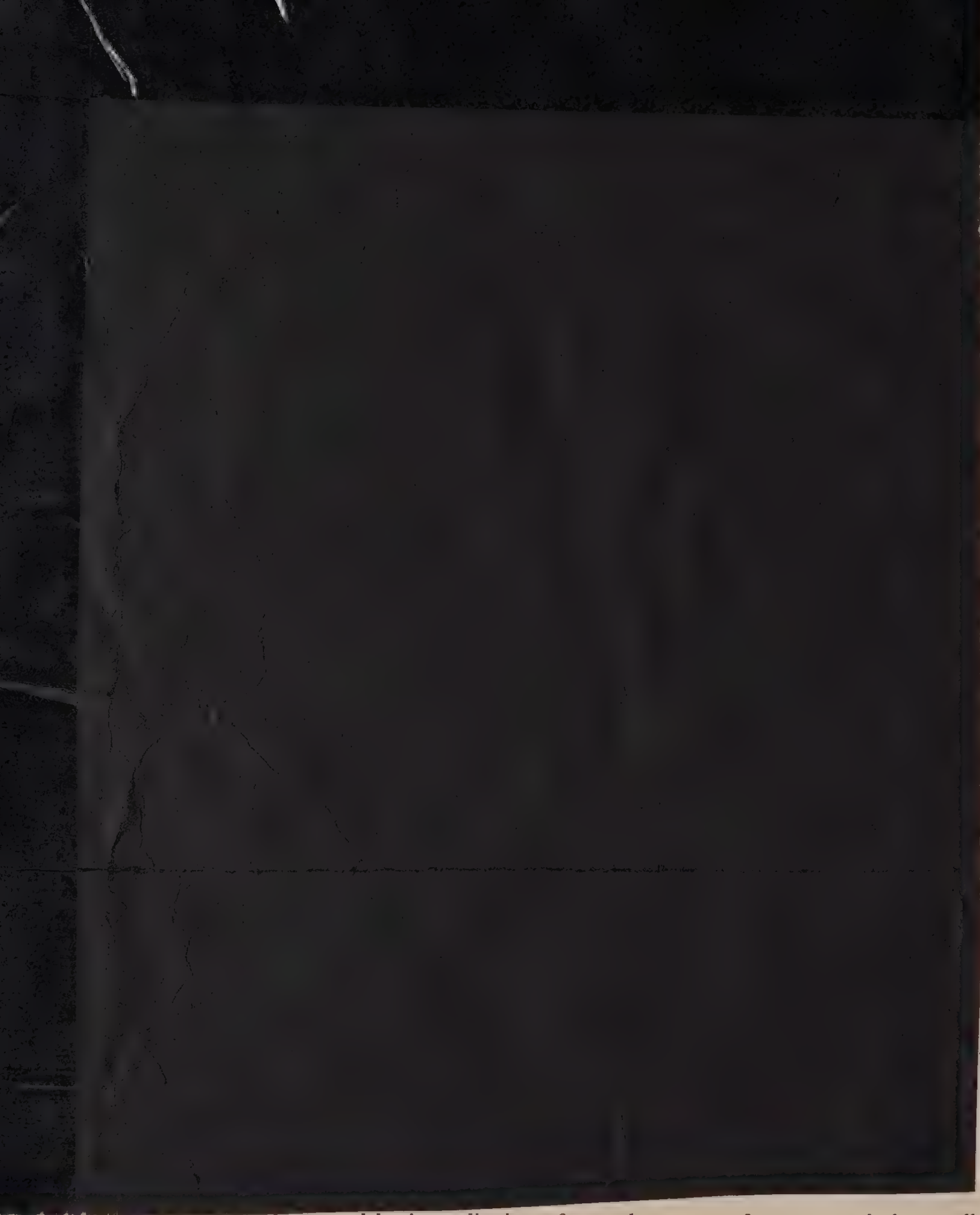
Plain wall areas were cast against plywood forms, but a large portion of the formwork required special forming materials. Milled wood was used for the pilaster fluting and, for more intricate detail, plaster waste molds were required.

Work on the superstructure was concluded on January 10,

1938, and at that time it was esti
would be required to complete
this work, the County Board of
Council each appropriated $250,0
was appropriated by WPA at the
of grading, landscaping, and co
ways and sprinkling system.

Column capitals and much of the deta
waste molds. Colored tile was used ar

Two wings project from the east fac
proposed additional civic buildings.



In an effort to solve part of the parking problem in downtown Detroit, this Shoppers Parking Deck was erected last year. Cars can be parked on ground level and on two floors above grade reached by ramps. The structure is entirely reinforced concrete. Designed by Smith, Hinchman & Grylls, Inc., architects, it was built by Bryant & Detwiler, contractor.

Shoppers Parking Deck—Detroit

By W. S. Wolfe*

As is the case in central business districts of most large cities, the problem of parking automobiles has become a major problem in downtown Detroit. Following the success of recent attempts to solve this problem economically by construction of parking decks, such a structure has been completed on a lot approximately 110x200 ft., located at Broadway and Grand River Avenues in Detroit.

Two supported levels are provided for parking as well as the ground level. No attempt was made to enclose the structure or to provide heat other than for the control office. The general plans show the long span, shallow depth beams and few columns which would seem to increase the cost of the building; but the square foot area of beam side forms was reduced thereby as was also the required length of ramps, and the small number of interior columns increased the ease of operation and made the arrangement of parked cars more flexible.

A permanent firesafe structure was desired rather than one which could be conveniently taken down and moved elsewhere. Reinforced concrete was, therefore, chosen in preference to other materials.

In order to provide proper drainage for water falling on the roof, as well as for water and snow brought in on the other floors by the cars, all levels have a slope of approximately 10 in. from a high line along the center to low points along the sides, or about 10 in. in a little over 50 ft.

To keep down the dead load and improve the quality of the exposed concrete, 3,750-lb. concrete was used for all the columns, beams, girders and supported slabs. A commensurate working stress of 1,500 p.s.i. was used in the

*Chief Structural Engineer; Smith, Hinchman & Grylls, Inc., architects, Detroit, Mich.

design. The results were very satisfactory. Dead load was further reduced by using concrete as the finish material. The building was designed for a live load of 80 lb. per sq.ft.

With long span shallow beams and girders framing into short, relatively stiff columns, it was necessary to design the columns for considerable moment as well as for the direct load. Special reinforcement was provided in the columns as shown in one of the illustrations to resist the stresses due to bending.

For most of their length, the floor beams have compression at the top with the slab acting as a T; so compression reinforcement is not necessary and the width of stem is determined by shear and the amount of tension steel to be enclosed. At the center girder, however, there is a large negative moment in the beams, and since the girder is the same depth as the beams, it seemed undesirable to provide any compression reinforcement because of interference with the girder steel, which would have been necessary if the stem width had been maintained uniform throughout. The beam stems were, therefore, increased at the girder to 3 ft. 8 in. or more as indicated.

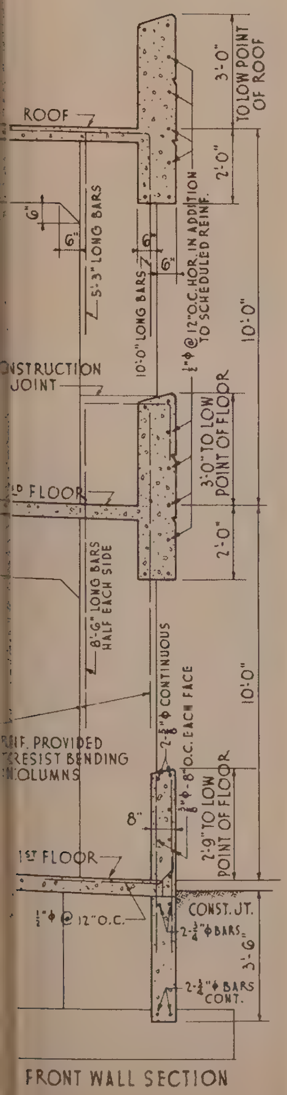
Area of reinforcement required and also the location of bends for the beams and girders were determined by the use of moment diagrams. These diagrams were drawn with two base lines—one giving the possible maximum negative moment, and the other the maximum positive moment. Steel was then designed to take care of either condition as well as any condition between the two.

Some unusual and interesting structural features are:

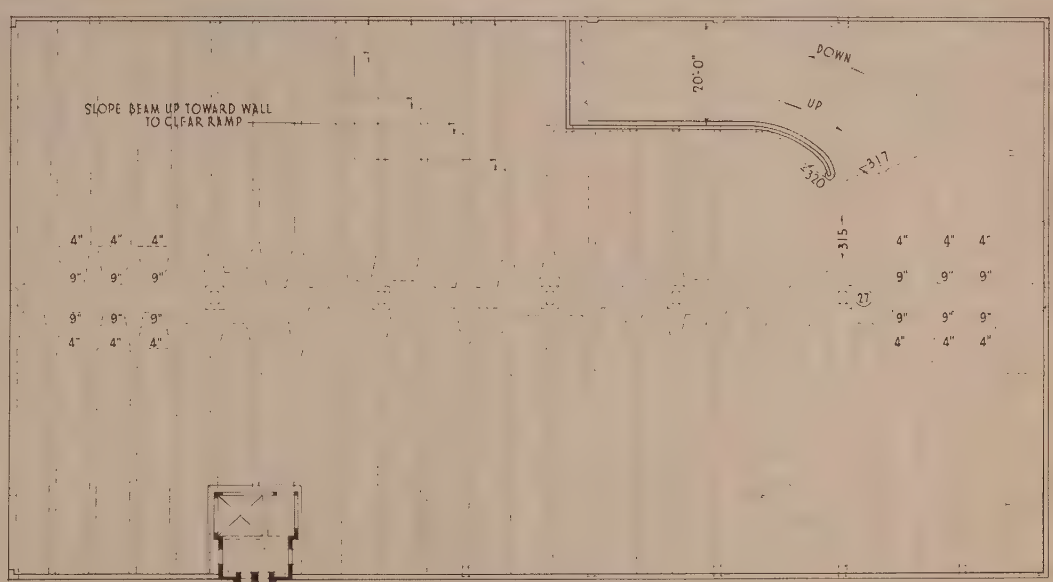
At column 27 (*see drawing*) beam 315 cantilevers about 22 ft. beyond the column center to pick up the ends of beams 320 and 317 which support ramp area as well as floor areas;

All girder stems were made wider at the columns in

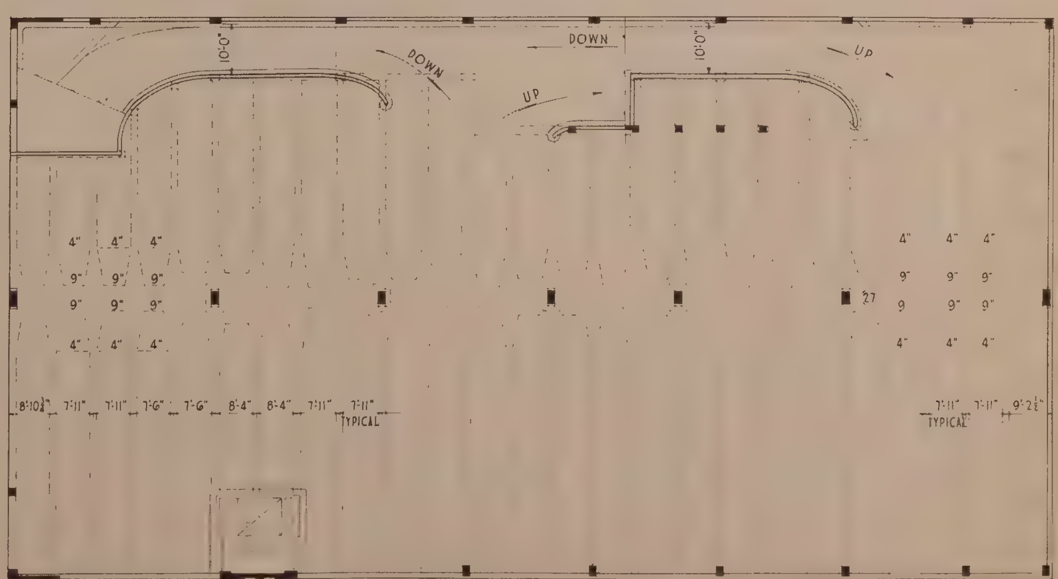
Unusual features of the structural design are uniform depth of joists and girders, warped floors to provide headroom over ramps and the arrangement of beams to support the ramps.



FRONT WALL SECTION



ROOF PLAN



SECOND FLOOR PLAN

All concrete surfaces of the Shoppers Parking Deck were finished with white portland cement paint.

order to take care of the negative moment;

The 4-in. slabs were increased in thickness to 9 in. at the sides of some of the girders in order to provide a more satisfactory T;

At several places the floor was warped to provide sufficient headroom over the ramps. In some cases depth of beams was decreased and some were turned up.

For the sake of economy the spandrel walls were kept as simple as possible with two rustication lines employed as the only decorative relief on these surfaces. The central tower which contains control rooms has three pilasters rising above the entrance canopy and two concrete grilles in the third-story front. Two coats of white portland cement paint finished this functional structure.

The structure has been in use several months, and there has been no trouble with leakage through the 4-in. slabs despite the fact that no special treatment was given to the slabs. However, special temperature steel was provided in both directions in the top of the slabs.

Designed by Smith, Hinchman & Grylls, Inc., architects; the structure was built by Bryant & Detwiler, general contractor of Detroit.

•

Complete Clayton's Play Facilities

By Hal Lynch, Architect

TWO new architectural concrete structures—a club house and a play shelter—complete the play facilities in Charles A. Shaw Park, Clayton, Mo., which were started in 1936 with the erection of a concrete swimming pool and bathhouse. Now this small but rapidly growing city on the edge of St. Louis claims one of the best recreational layouts in the Middle West.

The club house, turned over to the city in April, 1938, is a two-story structure with a small stadium located on one side. All exterior walls, including ornamentation which was kept to simple flutes and bands, are architectural concrete. Wall thickness is 12 in. Masonite form liners, with the screen side to the concrete, give an interesting texture to the surfaces which were left without finish treatment other than thorough cleaning. Exposed concrete inside of the building has the same texture except in the second floor lounge where milled wood strips were placed vertically in the forms. The finish here is a stain which gives the impression of knotty pine wall panels.

With the club house well under way, construction of the play shelter was started in a wooded section of the park. This building is of modern design and includes a wading pool, drinking fountain, barbecue pit and rest rooms. Its concrete slab roof projects beyond the row of supporting columns.

All of the buildings in Shaw Park were designed by the writer and were erected by WPA labor. The park and facilities were conceived and fostered by Mayor Charles A. Shaw who was supported throughout the building program by the Park Board and the citizens of Clayton.

Completing the modern playground facilities in Shaw Park, Clayton, Mo., are the club house (above) *and the play shelter* (below), *both built last year. An architectural concrete bathhouse and pool were erected previously. All the structures were designed by Hal Lynch, architect, and built by WPA labor.*

The main facade of the Scottish Rite Temple, Oakland, Calif., was rebuilt last year with reinforced concrete. Old materials were stripped off and forms were erected for the new facing. The large sculptured panel over the entrance was cast against a waste mold comprising 18 separate pieces. Will G. Corlett was architect and engineer for the reconstruction.

By Will G. Corlett
A.I.A., M. Am. Soc. C.E.

Reconstruction with Architectural Concrete

RECONSTRUCTION of the front of the Oakland, Calif., Scottish Rite Temple involved the removal of the old facing, brick backing, brick fireproofing and some concrete fireproofing, and replacing this old material with an architectural concrete facade. At all times during the work it was necessary to protect the interior finish, furring and plaster close to the walls. Due to the necessity of working entirely from the outside, difficulties in both design and execution had to be overcome.

A design sound in construction, economical in cost and of enduring permanence, was essential. It was, of course, necessary to design a new facade in architectural harmony with the main mass of the building—simple, because of cost limitation, but having dignity properly expressing the character and purpose of the structure.

The design was carried out in reinforced concrete with no precast work or exterior plaster coats. The new reinforced concrete front was securely attached to the existing steel frame by welded anchors. Joints between new and old concrete were keyed and gunited after practically all shrinkage had taken place. The weight of the new front was less than that of the facing and backing removed so no foundation changes were necessary except anchorage to the foundation. The entire front was designed for a 10 per cent gravity lateral force for earthquake resistance.

Accurate, careful and thoroughly tied and braced forming was done with smooth plywood up to the fourth-floor level, with T&G end-matched boards above the fourth floor in combination with plaster mold ornamental work. The forms had to be built "backwards"; that is, the inside form had to be built first, moved into place, and the outside form built last. Placing form clamps and ties was difficult because of the inaccessibility of the back of the forms. Accurate and tight forming was essential to assure true plane surfaces, straight lines, clean corners and edges, aligned column flutes, uniform surfaces and no visible construction joints or overlaps between lifts of concrete.

The problem presented by the construction joints was

further complicated by the necessity for an unusual number of lifts of concrete of small yardage. There were 28 different lifts. Due to the sheer height of the work, scaffolding, hoisting and safety provisions were difficult.

The facade is 110 ft. high, the central motif 89 ft. wide and the total width of the building 154 ft. The columns are 8-in. thick hollow concrete cylinders cast in place around steel columns and are 5 ft. 2 in. in diameter and 42 ft. high. Quoin joints in the base course are 5 ft. 7½ in. center to center and the "joint" lines in the colonnade height slightly over 8 ft. The "wave" mold belt course is 3 ft. 7½ in. high. The molded figure panel above the colonnade is 56 ft. long and the figures are 15 ft. high.

Plaster waste molds used for the large figure panel were in 18 pieces, each of which weighed, when dry, as much as 900 lb. All 18 pieces forming the whole panel were erected before any part of the panel concrete was placed. The waste mold parts were carefully lined up, reinforcement placed, forms braced and tied, touched up from the inside at joints—and then the concrete for the entire panel was placed in one slow, continuous operation. Joints between the waste mold parts were practically indistinguishable even at close range, and required no cutting or patching of the surface.

The face of the figures is flush with the wall surface and the maximum incision depth of th modeling is 5½ in. Total wal thickness at the figure panel, in cluding modeling, is 16 in. Three quarter-inch maximum aggregat was used in the concrete mix fo the panel.

Two concrete mixes were use throughout the job—one with 1¼-in. maximum aggregate, and the ¾-in. maximum mentioned above. The ratio of cement to total aggregates was approximately 1 to 6.1. Seven gallons of water per sack of portland cement was used with a maximum slump of 6 in. Average 28-day strength was 3,300 p.s.i. All concrete used on the job was mixed at a central plant and delivered to the job in transit mixers.

After the new wall was placed and cured, the entire facade was brush coated with a waterproof white portland cement wash, followed immediately with a fine dash.

The coursed walls up to fourth-flo level were formed with plywood which milled strips were tacked. Abo this level the plain surfaces were ca against narrow T&G boards. T entire surface was then given a whi portland cement wash.

Jail for Lewis County, W. Va.

By Carleton C. Wood*

...es an old stone and brick structure ...880. It adjoins and is connected to ... itself a brick structure and product ...roblems in construction of the jail ... to or failure of the old courthouse

...s two stories, raised on a plan of ...e and plan to care for current and ... the county. The architectural style ... modified by classic touches to keep ...ditional styles in the community.

...It connects with the old brick courthouse. ...J. Wood & Son, Associates, architects,

The concrete interior wal
exposed except for a fini
cement paint. This provid
structible surface for cells
economies in construction.

One advantage in the use of concrete was the ease with which jail equipment such as door bucks, window guards and cell facilities could be built into the walls. The exterior, like the interior, was finished with two coats of white portland cement paint.

Concrete was selected for several important reasons:

It provides a dense structural enclosure to prevent escape, which was a fundamental consideration. The construction permitted a satisfactory method of building into the structure all jail equipment such as door bucks, window guards and cell facilities. The fact that no additional material was required to provide finished cell walls was an economical advantage, and the concrete also provided a surface which is not easily marred and is practically indestructible. The tenants find little opportunity to be destructive in concrete enclosures.

An interesting feature is that the jail proper is winter air-conditioned, and to date there has been no condensation necessary to eliminate slight fins occurring occasionally at joints between plywood panels.

It was originally planned to build the jail through the aid of a PWA grant, but application for the grant was not approved in 1937 and the need for new facilities was so pressing that the court, comprising Messrs. E. A. Crawford, Hugh Butcher and Ralph See, decided to proceed with the structure using only county funds. Lewis County today has a modern jail, constructed from current revenue, without any bonded indebtedness against future revenue.

The jail, which was built and completely equipped for $60,577.50, was built by John L. Earnest & Sons of Wheeling. Elwood S. Tower was mechanical engineer.

Several buildings of reinforced concrete comprise the new, modern industrial plant erected for the Lane-Wells Company at Huntington Park, Calif. Beauty and simplicity were the aims of the architect, William E. Mayer. S. B. Barnes was structural engineer and C. W. Driver, the contractor.

A Modern Industrial Plant

By William E. Mayer, Architect

THE new plant of the Lane-Wells Co. at Huntington Park, Calif., is a group of reinforced concrete buildings erected on a site approximately five acres in extent. The structures comprise administration, engineering, laboratory and research, and instrument buildings, a main shop and experimental shops. Recreational facilities included in the layout are tennis, handball and badminton courts.

Lane-Wells Co. is engaged in the manufacture of special scientific machinery used in oil production, directional drilling and underground surveys. Requirements for this type of manufacture necessitated structural features that could be best achieved by means of a building material which is not only economical and firesafe, but also adaptable to good architectural design. Reinforced concrete, which answers all these requirements, was used throughout.

Simplicity, the Foundation of Efficiency, was taken as the motto for the planning and designing of the entire project; and with this motto as a guide, construction commenced and was carried to a satisfactory conclusion.

One of the most interesting structural features arose from the unusual soil condition encountered. The entire site is covered with a fill approximately 20 ft. deep, consisting of old broken slabs, bricks and miscellaneous debris. It was, therefore, impossible to drill for caissons, and other means would have proved too expensive. Accordingly, it was decided to compact the soil by setting off depth charges, and puddling. By this means the surface was dropped about 2 ft. This method has subsequently proved satisfactory inasmuch as none of the buildings shows any signs of settlement cracking or other damage although they went through a period of unusually heavy rains and minor earth shocks.

The buildings are designed to resist a seismic force of 10 per cent gravity, acting laterally. Concrete floors act as diaphragms for distributing this force to the exterior walls, partitions and columns which were reinforced to transmit seismic forces to the foundations.

Roofs of the shops were framed with long span concrete girders supporting the saw-tooth concrete slab skylights. The saw-tooth concrete slabs were placed in one continuous operation and, being on an angle, a mix with zero slump was used. No difficulties were encountered in keeping the concrete in place without a top form. Contrary to popular

belief that concrete saw-tooth construction is expensive, it was found reasonable in cost. Moreover the uniform distribution of light made for an economical arrangement of machinery since every square foot of floor could be used for working space.

Exposed exterior surfaces were formed against plywood and reverse molds were used for rounded portions of the buildings. These forms provided the desired smooth finish. To produce a uniform color, all buildings received a spray coat of portland cement paint. Interior surfaces were plastered or painted to aid illumination.

The main shop, covering an area of approximately 20,000 sq.ft., is used primarily for the manufacture of a special gun for perforating oil well casings. This building is flooded with north light from the saw-tooth skylights over the entire roof. Since the machinery used in this shop is exclusively operated by electricity, it was a simple matter to conceal all conduits and pipes in the concrete structural members thus eliminating all obstructions generally encountered when exposed service lines are used.

The instrument building is used for manufacture of directional drilling and underground survey instruments, and numerous other tools and machines. Incorporated in this structure are photographic and X-ray facilities and an array of research equipment which would be a revelation even to a scientist. It is doubtful whether any material other than reinforced concrete would have lent itself to fulfill all the requirements called for in this structure. Other buildings concerned with production are built on similar lines according to their particular requirements.

The administration building is used for offices only and is entirely architectural concrete. It is equipped with the most modern conveniences such as air conditioning, internal and external communication systems and other requirements of a firm doing a world-wide business. The design is modern, conforming in spirit with the products manufactured. Simple horizontal moldings and good proportion lend grace and beauty, and it is a good example of the adaptability of concrete to fine architectural effects.

Departing from the obsolete principle that appearance is of minor importance to a plant of this character, everything was done to prove that beautiful buildings are a distinct asset no matter for what purpose they are intended. Surprising, even to the Lane-Wells Co., has been the psychological effect this new model plant has exercised on customers and employes alike. When one enters the plant nothing reminds him of manufacturing, for beautiful flowers and shrubs, well-kept grounds and distinctive buildings have removed the stigma of the old-fashioned factory.

In conclusion it should be said that this beautiful manufacturing plant has not only proved a good investment for the owners, but its effect on the community has been to encourage good architecture and construction in the surrounding neighborhood. When factory buildings can arouse civic pride, a new era of industrial architecture must be at hand.

All the work concerned with the design and execution of the plant and layout was done by the writer in cooperation with S. B. Barnes, structural engineer, and C. W. Driver, the contractor.

Rounded corners and large continuous glass areas give the buildings a pronounced horizontal feeling, but the tall pylons provide interesting contrasts at entrances.

Saw-tooth concrete roofs provide north light for all the buildings.

Design requirements for strength and modern appearance suggested the use of architectural concrete for Houston's newest hospital, a maternity building erected for the Sisters of Charity of the Incarnate Word. It was designed by I. E. Loveless, architect, who had planned two previous hospitals for the same owners. Southwestern Construction Co., of Houston, was the general contractor.

Maternity and Childrens' Hospital, Houston

By I. E. Loveless, Architect

NEWEST hospital structure in Houston, Texas, is a large maternity building designed and erected for the Sisters of Charity of the Incarnate Word who operate St. Joseph's Infirmary. This is the third hospital recently designed by the writer for the same owners. And the other two—at Long Beach and San Bernardino, Calif.—are, as this one, built of architectural concrete.

The new building, which varies in height from five to six stories, is elevated on an irregular plan of approximately 74x233 ft. Numerous setbacks and reveals characterize the modern design which, in turn, suggested the use of concrete as the structural and finishing material for the building. The expression of strength, durability and security, which is most desirable for a hospital structure, is readily interpreted in modern concrete construction.

Although the building was designed for earthquake stresses, this fact does not reflect apprehension of immediate earthquakes in the Houston region. Rather, it indicates the desire of the owners for the type of sturdy, sound construction that can be purchased so economically in concrete. It stands to reason that any building able to resist earthquake stresses can withstand any other damage.

While all the decorative motifs on the building are not of religious derivation, enough of them are, to identify the structure. These ornamental details, confined principally to plaques, bands and spandrel and entrance treatment, were cast against plaster waste molds. Economy was effected by repeated use of ornament. In all, 20 different models were used for plaster mold detail and the total cost of these molds was approximately $2,000.

Plain surfaces were formed with 1x6 boards used for sheathing. Aside from the plaster mold detail the walls were finished with a 1-in. application of portland cement stucco. The stucco was applied in three coats, the final coat being a